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HUD Target Enterprise Architecture
V2.0
Volume 1 of 2

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1 INTRODUCTION

1.1 DEFINITION, PURPOSE, AND BENEFITS OF TARGET ENTERPRISE ARCHITECTURE

The Target Enterprise Architecture (EA) for the Department of Housing and Urban Development (HUD) is a business-driven plan that describes the desired end-state for HUD's performance, business, applications and services, technology, data, and security at the end of a five to seven year planning horizon. The framework of the Target EA is further described in Section 1.4 below.

The primary purpose of the Target EA is to effectively plan a course for achieving HUD's strategic vision and goals. It is one element in a broader set of inter-related planning activities that collectively enable HUD managers and staff to define a vision, develop strategies and plans for achieving the vision, make resource decisions, implement strategies, and evaluate performance.

By defining the desired end-state from several distinct perspectives (e.g. business, data, etc.), the Target EA also provides stakeholders with a "line of sight" into the complex relationships that exist among these different perspectives. For example, the Target EA provides insight into how a particular customer need translates into a set of target HUD business processes, and how those business processes will be supported by a common set of technologies.

HUD has over 200 information systems, executes overlapping business and information management processes, and relies on various technologies that are expensive to maintain. To reduce cost and streamline operations, HUD has adopted a service-oriented and component-based approach to architecture. This approach, consistent with government and industry best practice, enables HUD to "build once, use often." In other words, by separating out the functionality or capabilities of a business process or application into discrete pieces, components can be shared and reused across the enterprise. As a result of this approach, the HUD Target EA will:

- **Improve Program Performance** – The overarching benefit of the Target EA is that it provides opportunities to improve the efficiency and effectiveness of HUD's programs. It ensures that business functions support strategic goals and priorities, data is optimized in support of the business, and applications and technology solutions are driven by business needs. It also allows HUD to more readily share services across organizational and functional lines.

- **Simplify Investment Decisions** – The Target EA provides a line of sight from strategy to business function to technology, allowing decision-makers to be able to more quickly assess the relative value of initiatives, and to identify duplicative or misaligned initiatives.

- **Reduce IT Diversity and Complexity** – The Target EA simplifies HUD's IT environment by promoting standards and the sharing and reuse of common technologies.

- **Improve Interoperability -** The Target EA establishes enterprise-wide standards that promote platform and vendor independence, enabling greater interoperability across disparate applications, both internal and external.

- **Improve Utilization of Resources** – The Target EA reduces system development and operation and maintenance costs by eliminating duplicative investments, promoting sharing of common services, and establishing Department-wide standards.

- **Accelerate System Implementation** – The Target EA equips the Department's system developers and architects with a pallet of component-based services from which to choose that provide well defined functionality, thus maximizing reuse and portability of previously developed processes, components, code, etc.

1.2 PURPOSE OF TARGET EA VERSION 2.0 DOCUMENT

The purpose of Target EA Version 2.0 is to expand on Version 1.0 with the incorporation of a data layer, to address stakeholder comments received on Version 1.0, and to make other refinements as needed. Because Version 1.0 was not widely disseminated, the primary purpose of Target EA Version 2.0 is to serve as a discussion draft for HUD stakeholders to review, discuss,

comment on, and help to revise. HUD's Target EA will evolve and improve as stakeholders become engaged and actively participate in the development and implementation of the HUD EA. The intended near-term uses and impacts for Target EA Version 2.0 include:

- Engage stakeholders from throughout HUD to participate in the development and implementation of HUD's EA;
- Use stakeholder comments to refine the HUD Target EA, to be released as future versions;
- Ensure that IT initiatives are compliant with Target EA V2.0 in the fiscal year 2006-2007 IT Investment Management Select process;
- Provide the Office of Management and Budget (OMB) with the HUD Target EA, in fulfillment of legislative requirements and OMB mandates, and as a demonstration of the increasing maturity of HUD's EA practice;
- Begin implementation of the EA Transition Plan, which provides a high-level roadmap for moving toward the Target EA.

1.3 INTENDED AUDIENCE

Target EA V2.0 is applicable to all HUD organizations, representing the desired end-state for the Department's performance, business, applications and services, technology, data, and security at the end of a five-to-seven year planning horizon. All HUD executives, managers, and staff are encouraged to read, discuss, and comment on this document.

The Target EA defines the desired end-state for HUD from several distinct perspectives, ranging from high-level and conceptual to highly technical. Therefore, individual readers may find that selective reading of certain sections and appendices is more useful than an end-to-end review. The primary focus for specific HUD stakeholder groups is summarized below:

- **HUD Executives**– As the primary force within HUD responsible for ensuring that the Department fulfills its mission and progresses toward its vision, HUD executives must understand and support the desired end-state set forth in the Target EA and participate in efforts to

implement it. In particular, the Technology Investment Board Executive Committee (TIBEC) has responsibility for approving the Target EA.

- **Office of the Chief Information Officer (OCIO) Staff** – All OCIO staff should be familiar with Target EA V2.0. As members of the office with primary responsibility for planning and deploying systems and technology in support of the Department's business, OCIO staff need to understand the desired end-state for the Department and the specific services and technologies that will be employed. Key subsets of the OCIO staff for whom the Target EA has particular relevance have been further described below:

  - **IT Investment Management (ITIM) Staff** – The ITIM staff must understand the Target EA and be able to apply that understanding in the evaluation of HUD's IT investment portfolio.

  - **Program/Project Managers** – Program and project managers responsible for IT initiatives must ensure that the initiatives comply with the Target EA. Specific criteria for compliance with the Target EA will be developed and published in conjunction with the Department's ITIM guidance.

- **Business Managers** – Managers within HUD's Lines of Business (LOBs) should understand how the Target EA will support their business needs. They should closely review the sections of the document that address their LOBs and the services and technologies that will support them.

- **The Office of Management and Budget (OMB)** – As part of the budget submission process, HUD will submit this Target EA and other EA work products to OMB. OMB will use the Target EA to determine whether HUD has a cohesive framework for employing IT in support of its business, and whether individual IT initiatives are aligned with that framework. All initiatives must be aligned with EA in order to receive funding. OMB will also use HUD's Target EA to identify opportunities for HUD to participate in government-wide initiatives.

- **Other Peer Agencies –** HUD collaborates with other Federal agencies, such as the Department of Health and Human Services, the

Social Security Administration, and the Internal Revenue Service, in the implementation of its programs. Target EA V2.0 will help these partnering entities understand HUD's approach to its business and supporting technology.

1.4 BACKGROUND

The Clinger-Cohen Act of 1996 mandates the implementation of an effective EA policy and an associated EA practice. This act requires Federal Agency Chief Information Officers (CIOs) to develop, maintain, and facilitate "a sound and integrated information technology layer for the executive agency". Subsequently, OMB, in its Circular A-130, issued explicit guidance that requires agency information system initiatives to be consistent with the Agency's EA.

While the development and maintenance of an EA is mandated by OMB, HUD approaches EA as a tool for business transformation and progress. Since the passage of these mandates, HUD has steadily built an active EA practice to meet the business needs of the Department. The EA practice is led by HUD's Chief Architect within the OCIO, but its activities rely heavily on a partnership with the business and IT communities across HUD. Since the formation of HUD's EA practice, HUD has successfully established many elements of a comprehensive EA program, outlined below. Target EA V2.0 builds upon this prior work:

- **Baseline EA** – The Baseline EA details the current or "as-is" state of HUD's business, data, applications, and technology.
- **EA Principles** – HUD's EA principles are brief statements of preferred direction or practice. They help establish a common vision to ensure that strategic objectives are not compromised by tactical decision-making. The principles have been refined and included within Target EA V2.0.
- **EA Policies** – EA policies provide the governance foundation for the development, maintenance, and implementation of EA.
- **EA Communications** – HUD has crafted and begun executing an EA communications strategy to ensure that stakeholders across HUD

participate in the development of EA and understand its impact on them.

- **IT Lifecycle Framework** – The IT Lifecycle Framework is a planning and integration framework consisting of architecture, investment, and implementation. It provides the means to ensure that IT initiatives are driven by EA.

- **Future State Technical Architecture** – In lieu of a comprehensive Target EA, HUD defined a Future State Technical Architecture that provided a framework for organizing the supported technologies of the Department. The intent of this early effort is now encompassed in the Technology Layer of Target EA V2.0.

- **Segment Architectures** – In order to parcel detailed EA efforts into attainable pieces, HUD has introduced the concept of Segment Architecture as a key element of the EA practice. A Segment Architecture is IT architecture for an individual Line of Business (e.g. Multi Family Housing Finance) or a cross-cutting service (e.g. Tracking and Workflow, Grants Management). HUD has begun to define Segment Architectures for several LOBs and cross-cutting service segments.

- **Strategic Portfolio Reviews** – In recognition of the need for closer coupling between EA and HUD's ITIM lifecycle, particularly in the Pre-Select and Select ITIM phases, HUD's EA practice undertook its first annual Strategic Portfolio Review (SPR) last year. After completing Target EA V1.0, HUD completed a Strategic Portfolio Review of the FY 2005-2006 portfolio, which includes strategic recommendations and initiative-specific guidance designed to advance the IT portfolio relative to the principles defined in the Target EA.

- **Enterprise Architecture Management System (EAMS)** – HUD configured and deployed the EAMS automated EA repository to facilitate the capture, use, and management of its EA information.

Across the Federal government, there has been growing interest in EA efforts both within and across agencies. Driven by the President's Management Agenda, guidance from OMB and other best practices, agencies are increasingly working toward government-wide architectures and

solutions. HUD participates in efforts to define and implement government-wide solutions. HUD's EA leverages government-wide services and solutions when it makes practical business sense to do so. The three most notable of these government-wide activities are:

ELECTRONIC GOVERNMENT (E-GOV) INITIATIVES – In Fall 2004, in support of the President's Management Agenda goal of expanding electronic government, OMB and Federal agencies worked together to define 24 high-value government-wide E-Gov initiatives. These initiatives are intended to eliminate redundant systems and significantly improve the government's quality of customer service for citizens and businesses.[1]

LINE OF BUSINESS INITIATIVES – In March 2004, OMB kicked off a government-wide analysis of five lines of business. Interagency teams are examining business and IT data and best practices for each line of business – financial management, human resources management, grants management, Federal health architecture, and case management. The goal of the effort is to identify opportunities for the FY 2006 Budget to identify common solutions for business processes and/or technology-based shared services for government agencies.[2]

FEDERAL ENTERPRISE ARCHITECTURE – To facilitate efforts to transform the Federal government to one that is citizen-centered, results-oriented, and market-based, OMB is developing the Federal Enterprise Architecture (FEA), a business-based framework for Government-wide improvement. The FEA is being constructed through a collection of interrelated "reference models" designed to facilitate cross-agency analysis

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[1] *Details can be found at http://www.whitehouse.gov/omb/egov/*

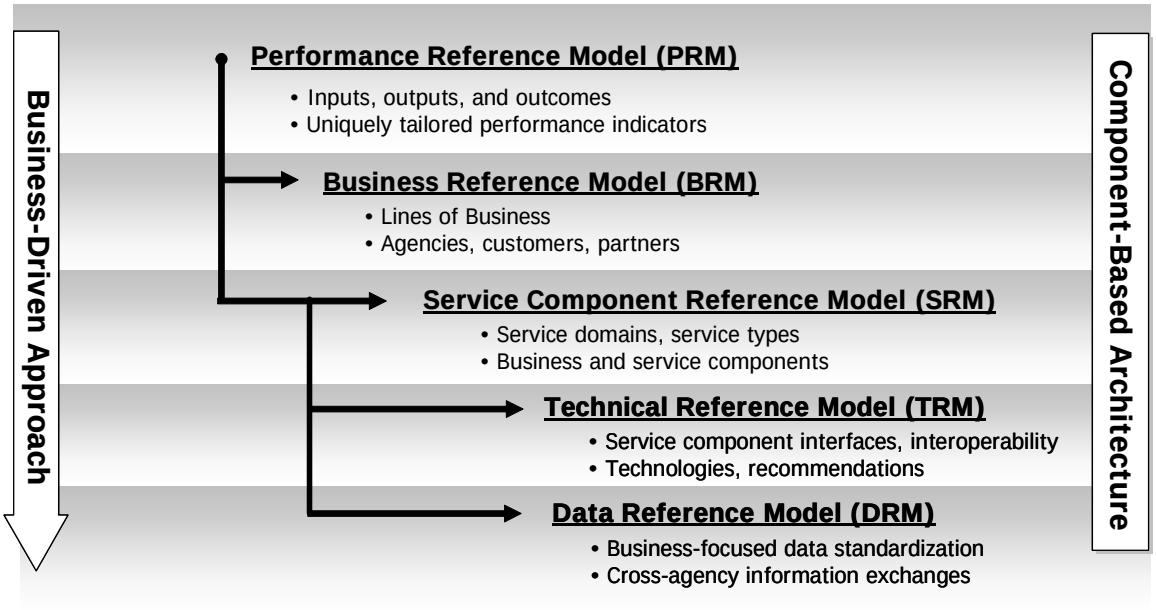
[2] *Details can be found at http://www.whitehouse.gov/omb/egov/c-6-lob.html*

and the identification of duplicative investments, gaps, and opportunities for collaboration within and across Federal Agencies.[3]

Exhibit 1-1 below helps to illustrate how the FEA reference models are related. The HUD Target EA is aligned with the FEA. Details on how each Target EA layer aligns with the FEA are provided in Sections 5 (Business Layer), 6 (Applications and Services Layer), 7 (Data Layer), and 8 (Technology Layer).

[3] *Details can be found at http://www.whitehouse.gov/omb/egov/a-1-fea.html*

Exhibit 1-1 – Federal Enterprise Architecture Contents



1.5 TARGET EA FRAMEWORK

HUD's Target EA framework defines the set of products that will constitute a comprehensive Target EA for HUD. It is consistent with government and industry best practices for EA. It represents an evolution from the CIO Council's Federal Enterprise Architecture Framework (FEAF) Version 1.1, and is fully aligned with OMB's FEA reference models.

The Target EA framework is depicted graphically in Exhibit 1-2 and summarized below. Note: Target EA Version 2.0 does not encompass all elements of the Target EA framework. Those framework elements not addressed within the scope of Target EA Version 2.0 are summarized in Section 1.6 below.

Exhibit 1-2 – HUD Target EA Framework

Principles – HUD's EA principles are brief statements of preferred direction or practice. They help establish a common set of guidelines to govern the development and implementation of EA.

Strategic Direction and Drivers – HUD's Strategic Direction and Architectural Drivers set the foundation upon which the Target EA is developed. Because HUD's business strategy drives the Target EA, this section encompasses HUD's mission, vision, goals and objectives, as defined in the *HUD Strategic Plan, FY 2003-FY 2008*. As technology enables business processes, this section also encompasses HUD's strategic IT mission, vision, goals and objectives, as defined by the *HUD IT Strategic Plan, FY 2005-FY 2010*. Finally, it defines HUD's Architectural Drivers, internal and external factors that influence HUD's Target EA and architectural decision-making process.

Conceptual Target EA – The Conceptual Target EA builds on HUD's strategic direction and drivers, and provides a high-level conceptual understanding of HUD's desired end-state. The purpose of the Conceptual Target EA is to establish a common understanding and sense of direction across HUD, setting the foundation for the more detailed architectural layers. The Common Requirements Vision (CRV) details a set of

requirements that translates HUD's strategic direction and drivers into a set of required common services. The Target EA Conceptual Model provides a high-level understanding of the entire HUD EA through a series of graphical models. The Conceptual Target EA also introduces several key concepts or characteristics of the Target EA that are fundamental to readers' understanding of the architectural layers.

Architectural Layers – The Target EA provides the details of HUD's target performance, business, applications and services, data, and technology layers. In addition, security is addressed in each of these five layers. Each layer provides a different perspective on HUD's target environment, as summarized briefly below:

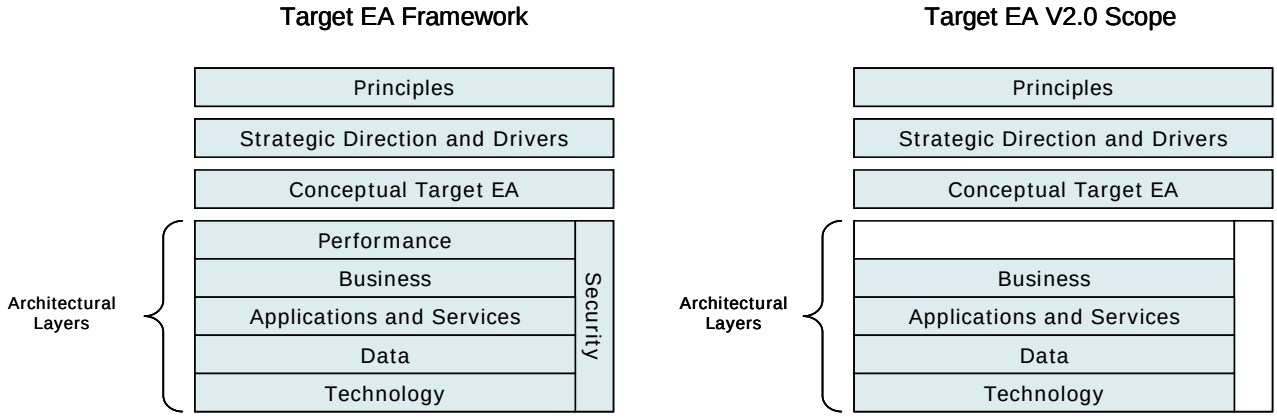
- **Performance** – The performance layer defines the measures used to determine the performance of IT investments and their contribution to program performance.
- **Business** – The Business Layer defines HUD's business areas, LOBs, business functions, and sub-functions.
- **Applications and Services** – The applications and services layer defines the set of service domains, types, and components that will provide the information processing capabilities needed to support HUD's business (i.e. the ability to capture, store, access, and manipulate business data and information).
- **Data** – The data layer defines the data and information that support program and business line operations.
- **Technology** – The technology layer defines the technology standards, specifications, and products that support the secure delivery, exchange, and construction of HUD's business and application services.
- **Security** – The security layer defines the security elements to be woven into all of the other architectural layers. It encompasses security policies, processes, performance measures, data, and technologies.

1.6 TARGET EA VERSION 2.0 SCOPE

The organizational scope of Target EA Version 2.0 is the entire HUD enterprise. It represents all of HUD's offices, LOBs, business functions, and supporting services and technologies. It is driven by HUD's Strategic Plan and therefore fully supports and aligns with HUD's mission, vision, goals, and objectives.

In terms of population of the Target EA framework, Exhibit 1-3 below shows which elements of the framework are encompassed within Target EA Version 2.0. As the graphic depicts, there are two architectural layers that are not addressed in detail in Target EA V2.0: Performance and Security. HUD's plans to incorporate these layers in future versions of the Target EA are detailed in Section 1.7 below.

Exhibit 1-3 – HUD Target EA Version 2.0 Scope



1.7 PLANS FOR EVOLVING THE HUD TARGET EA

The HUD EA practice will continue its efforts to further refine and implement the Target EA through a number of related and coordinated efforts. This Target EA is HUD's first effort to define a comprehensive Department-wide EA. The Target EA will evolve through a series of releases or versions. The HUD EA practice will use V2.0 as a communication document to begin bringing a broader community of HUD stakeholders more actively into the discussion about the desired end-state for HUD. HUD stakeholders at all

levels are highly encouraged to participate in the definition of future versions of HUD's Target EA.

The Target EA will be augmented in the near-term with the Performance Layers. HUD has begun the task of integrating security within each applicable element of the EA. This will improve HUD's ability to protect systems and the information that it processes and improve its ability to effectively support its business needs. Performance measures associated with the different architectural layers are best understood and defined by the LOB to which they apply. Therefore, performance measures will be defined through HUD's Segment Architecture efforts, and will eventually be rolled up and integrated into the overall Target EA. Security will be addressed holistically at the Department level through the development of focused security segment architecture.

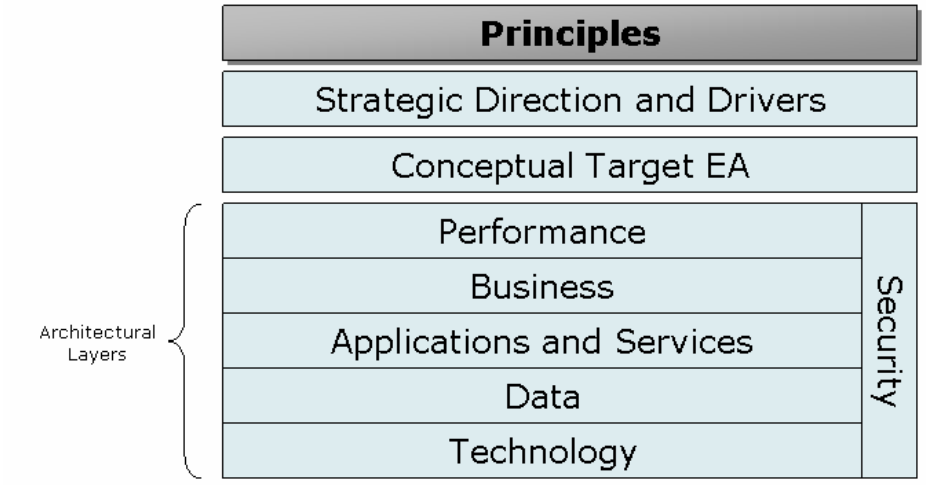
2 PRINCIPLES

2.1 INTRODUCTION

HUD has adopted a set of architecture principles to ensure that EA supports HUD's business and technology requirements. Architecture principles are succinct statements of preferred direction or practice. They help establish a common vision to ensure that strategic objectives are not compromised by tactical decision-making.

HUD's architecture principles are key to the development and implementation of the Target EA. They provide context for making decisions and guide the development of programmatic and enterprise solutions. They will also help in prioritizing and sequencing transition projects that will move the Department from its current environment toward the target environment. Exhibit 2-1 below shows how the principles fit into the overall HUD Target EA framework.

Exhibit 2-1 – Target EA Framework: Principles



This section first presents a summary of HUD's 10 principles, and then provides a more in-depth articulation of the rationale and implications of each principle.

2.2 PRINCIPLES SUMMARY

The following 10 principles guide the development and implementation of the HUD's EA:

1. HUD maintains a single Department-wide EA.
2. HUD's mission, strategies, goals and objectives guide the design of HUD's EA.
3. Compliance with HUD's EA is a prerequisite for IT investment.
4. HUD participates in efforts to define and implement government-wide solutions.
5. HUD's EA promotes sharing, reuse and common solutions.
6. HUD's EA reduces complexity through the use of enterprise standards.
7. Information and data are managed as enterprise assets.
8. Security and privacy are integrated into all architectural layers.
9. HUD's EA is implemented through segment architectures.
10. HUD's EA seeks to employ current technologies in creating solutions for its stakeholders.

2.3 PRINCIPLES DETAIL

2.3.1 HUD maintains a single Department-wide EA.

Rationale:

- HUD's EA identifies economies of scale, streamlines interactions and communication with stakeholders and reduces stovepipes and unnecessary duplication.
- HUD is mandated by the Clinger-Cohen Act and OMB Circular A-130 to develop and enforce a single EA.

Implications:

- Strategic planning, resource allocation and IT investments are optimized at the Department level.
- HUD respects unique program-specific mandates, roles and functions.
- Data, applications, and infrastructure are assets and resources of the entire enterprise.
- Individual HUD offices or programs may have to concede their own preferences for the greater benefit of the entire enterprise.
- All HUD organizations and business lines "own" EA. All HUD organizations and business lines have a stake in the definition and implementation of EA.

2.3.2 HUD's mission, strategies, goals and objectives guide the design of HUD's EA.

Rationale:

- Integration of business and IT planning and strategy ensures that IT effectively enables and supports HUD's mission.

Implications:

- HUD's EA supports the Department's mission, vision and strategy by streamlining business processes and information flows and effectively applying enabling technologies.
- HUD's business and IT leaders must engage in strategy development and planning together.
- Program staff must actively participate in the definition and implementation of HUD's EA.
- Major new or replacement information system investments will be approved only after work processes have been examined for modernization or reengineering opportunities.
- New systems will be designed to be flexible enough to evolve with changing business, functional, and technological requirements.

2.3.3 Compliance with HUD's EA is a prerequisite for IT investment.

Rationale:

- ITIM Lifecycle ensures that IT investments support the Department's objectives.
- HUD's EA fulfills business and information requirements while reducing duplicative investments.

Implications:

- All HUD offices have a stake in defining EA as it affects their funding for IT investments.
- IT investments must align with HUD's EA.
- Governance mechanisms are required to ensure investments conform to the architecture. Sound business justification is required for exceptions and/or waivers.

2.3.4 HUD participates in efforts to define and implement government-wide solutions.

Rationale:

- Government-wide solutions, such as the Presidential E-Gov and LOB initiatives, provide cost savings for the Federal government.
- Identified opportunities to integrate with other levels of government can yield cost savings and streamline interactions with HUD business partners.

Implications:

- HUD's EA and ITIM processes ensure investments are not duplicative of E-Gov and LOB initiatives.
- HUD's EA leverages government-wide services and solutions when it makes practical business sense to do so.
- HUD's segment architectures and individual initiatives explore opportunities to better integrate solutions with HUD's business partners.

2.3.5 HUD's EA promotes sharing, reuse and common solutions.

Rationale:

- Sharing, reuse and common solutions provide economies of scale for the Department and reduce duplication.

Implications:

- Reusable components and common solutions provide opportunities to reduce IT development costs and development time.
- Reuse must be a design consideration for all EA components.
- Common solutions can address any architectural layer.

- Investment, design and implementation decisions favor reusable components and common solutions.

- Requirements reflect the needs of all affected business elements and build in flexibility to address unique business requirements.

2.3.6 HUD's EA reduces complexity through the use of enterprise standards.

Rationale:

- Standardization reduces costs and time for meeting current and future business requirements.

- Enterprise standards provide an important mechanism for streamlining the technology landscape, ensuring the interoperability of systems and improving the stability of the environment.

Implications:

- EA governance (or EA and enterprise configuration management) reduces the number of technologies, products, and configurations in the environment.

- EA governance ensures that technical standards are approved, enforced, and refreshed as necessary. Governance mechanisms allow for exceptions and/or waivers in cases where there is a sound business justification.

- Emerging standards change required IT skill sets and generate requirements for staff training.

2.3.7 Information and data are managed as enterprise assets.

Rationale:

- Information leveraged across the value chain improves performance, supports decision-making and enables accurate reporting.

Implications:

- Data standardization is critical for all information and data types that are common to or shared across more than one HUD office or program.
- Data stewards are assigned for all enterprise data. Stewards have the authority and means to manage the data for which they are accountable.
- Data are captured once.
- Enterprise-wide access to data, based on users' business needs for and rights to that information, is the rule rather than the exception. Program areas provide corporate access to their data and information, barring restrictions due to data confidentiality, privacy, or "need to know" concerns.
- Geographic location does not constrain access to information and applications. Key enterprise information assets are accessible from all business locations.
- The way information is accessed and displayed is sufficiently adaptable to meet a wide range of enterprise users and their corresponding methods of access.

2.3.8 Security and privacy are integrated into all architectural layers.

Rationale:

- HUD safeguards confidential information to enhance public trust.
- HUD must comply with established security requirements, such as the Privacy Act of 1974, FISMA, and OMB A-130 Security of Federal Automated Information Resources (App.III).
- Considering security implications at the outset improves cost management and reduces risk.

Implications:

- Information and data must be protected from unauthorized access, use and disclosure.
- Security planning and management is integrated with all aspects of business and IT planning and governance, including: business, IT and E-Gov strategic planning; ITIM, capital planning and budget; data management; and, system development, engineering and integration.
- Data and information are clearly categorized based on security, privacy and sensitivity considerations, and rules are clearly defined and universally understood by data users.
- Audit and monitoring mechanisms are used to secure information resources.
- Public access systems are isolated from mission critical resources.

2.3.9 HUD's EA is implemented through segment architectures.

Rationale:

- HUD mitigates risk and demonstrates the value of EA to HUD programs by breaking the work into achievable segments (i.e., core HUD LOBs or cross-cutting service components).

Implications:

- Segment architectures are encompassed within the overarching HUD EA.
- HUD's EA reconciles and approves segment architectures.
- Segment architectures can span multiple offices and programs. HUD organizations and business lines have a stake in and should participate in the definition and implementation of relevant segment architectures.

- Approved segment architectures are a pre-requisite for IT investment.
- Segments incorporate government-wide solutions, where appropriate.

2.3.10 HUD's EA seeks to employ current technologies in creating solutions for its stakeholders.

Rationale:

- Current technology eliminates obsolete, non-serviceable systems and improves the overall quality and efficiency of information processing and delivery. Current technology improves the ability of information systems to respond quickly to changing business needs.

Implications:

- HUD continually monitors and researches new technologies and trends that may have direct applicability on the way it delivers its mission.
- In accordance with the Clinger-Cohen Act, business and information requirements should be met using commercial off-the-shelf (COTS) or government off-the-shelf (GOTS) technologies rather than customized or in-house solutions, whenever practical. To the extent practical, COTS and GOTS solutions should be used without modification or redesign. In cases where COTS or GOTS solutions must be modified to meet the business needs of the users, requirements should be defined to encompass all potential users across the enterprise, and the design should maximize component sharing and reuse across the enterprise.
- HUD maximizes the use of electronic commerce and Internet technologies aligned with government-wide initiatives to meet stakeholder expectations, whenever practical.

3 STRATEGIC DIRECTION AND DRIVERS

3.1 INTRODUCTION

Building on EA design and implementation guidance set forth by HUD's EA Principles, HUD's Strategic Direction and Architectural Drivers continue to lay the foundation upon which the HUD Target EA V2.0 is developed. Exhibit 3-1 below shows how the Strategic Direction and Drivers fit into the overall HUD Target EA framework.

Exhibit 3-1 – Target EA Framework: Strategic Direction and Drivers

The Strategic Direction and Drivers consists of the following three components:

HUD Mission, Vision, Goals, and Objectives: HUD's business mission, strategic vision, goals and objectives comprise the Department's business strategy, as defined in the *HUD Strategic Plan, FY 2003-FY 2008*. This sub-section describes HUD's strategic goals and the tactical objectives HUD will perform to accomplish its mission.

HUD IT Mission, Vision, Goals, and Objectives: HUD's IT mission, vision, goals and objectives set the IT strategy that the Department will

pursue in support of its business strategy, as defined in the *HUD IT Strategic Plan, FY 2005-FY 2010*. This section outlines the plan that HUD's IT community will carry out to provide HUD with the technology enablers needed to support its mission.

Architectural Drivers: Architectural Drivers are internal and external stimuli that influence HUD's Target EA and architectural decision-making process.

3.2 HUD MISSION, VISION, GOALS, AND OBJECTIVES

3.2.1 HUD Mission and Vision

HUD's Mission Statement is a succinct statement that articulates the Department's reason for being. It is the primary public description of "what" HUD does and "why" it exists. It is as follows:

HUD's mission is to increase homeownership, support community development and increase access to affordable housing free from discrimination.

HUD's Secretary has pledged to accomplish this mission while addressing the paramount need to improve HUD's performance and produce these improvements in a manner congruent with the highest standards of ethics, management, and accountability.

3.2.2 HUD Strategic Goals and Objectives

HUD's strategic goals for fiscal years 2003 -2008 can be categorized as either programmatic or cross-cutting. Programmatic goals apply to specific HUD program areas whose efforts benefit families and communities. In contrast, cross-cutting goals represent HUD priorities that have an enterprise-wide impact, affecting each of HUD's program areas. The goals and objectives are summarized below. Details can be found in the *HUD Strategic Plan, FY 2003-FY 2008*.

3.2.2.1 HUD's Programmatic Strategic Goals

Increase Homeownership Opportunities:

- Expand national homeownership opportunities.
- Increase minority homeownership.
- Make the home buying process less complicated and less expensive.
- Fight practices that permit predatory lending.
- Help HUD-assisted renters become homeowners.
- Keep existing homeowners from losing their homes.

Promote Decent Affordable Housing:

- Expand access to affordable rental housing.
- Improve the physical quality and management accountability of public and assisted housing.
- Increase housing opportunities for the elderly and persons with disabilities.
- Help HUD-assisted renters make progress toward self sufficiency.

Strengthen Communities:

- Provide capital and resources to improve economic conditions in distressed communities.
- Help organizations access the resources they need to make their communities more livable.
- End chronic homelessness and move homeless families and individuals to permanent housing.

3.2.2.2 HUD's Cross-Cutting Strategic Goals

Ensure Equal Opportunity in Housing:

- Resolve discrimination complaints on a timely basis.
- Promote public awareness of fair housing laws.
- Improve housing accessibility for persons with disabilities.

Embrace High Standards of Ethics, Management, and Accountability:

- Rebuild HUD's human capital and further diversify its workforce.
- Improve HUD's management, internal controls and systems and resolve audit issues.
- Improve accountability, service delivery and customer service of HUD and its partners.
- Ensure program compliance.
- Improve internal communications and employee involvement.

Promote Participation of Faith-based and Community Organizations:

- Reduce regulatory barriers to participation in faith-based and community organizations.
- Conduct outreach to inform potential partners of HUD opportunities.
- Expand technical assistance resources deployed to faith-based and community organizations.
- Encourage partnerships between faith-based/community organizations and HUD's tradition grantees.

3.3 HUD IT MISSION, VISION, GOALS, AND OBJECTIVES

3.3.1 3.3.1 HUD IT Mission

As conveyed in the *HUD IT Strategic Plan, FY 2005 - FY 2010* HUD's IT mission statement articulates what HUD's IT does and why it exists. The IT mission is a 5-7 year strategy. Defined collaboratively by HUD IT stakeholders, the mission statement is the primary driver of the Department's IT strategy. The HUD IT mission statement is below:

To enable delivery of HUD programs, services, and management processes by providing high-quality information technology solutions and services.

3.3.2 HUD IT Vision

HUD's IT vision is built upon the IT mission. It describes what HUD IT needs to be in the future in order to accomplish its mission, and support the HUD mission. The HUD IT vision is as follows:

Modern information technology that is secure, accessible, and cost-effective; meets customer needs; and exceeds their expectations.

3.3.3 HUD IT Goals and Objectives

HUD's Strategic Plan (FY 2003 -2008), and its encompassed business goals and objectives, drove the formulation of HUD's IT Strategic Plan (FY 2005 - 2010). As such, HUD's IT goals and objectives are in direct alignment with the Department's Strategic Plan. These strategic goals and supporting objectives provide a long-term roadmap for fulfilling the IT mission and achieving the IT vision. They are summarized below, with supporting details available in the *HUD IT Strategic Plan, FY 2005-FY 2010*.

Organization & Workforce - Consolidated and comprehensive departmental IT functions with clear organizational roles, responsibilities, and reporting structures, supported by a skilled workforce.

- Improve collaboration between the OCIO and program areas by end of 2nd quarter FY 2006.

- Finish implementing the proposed “Optimal OCIO structure” by end of 4th quarter FY 2005.
- Establish clear roles and responsibilities for OCIO offices and program area IT units by end of 2nd quarter FY 2006.
- Consolidate the IT functions across the Department by end of 4th quarter FY 2006.
- Recruit and retain a skilled IT workforce by end of 1st quarter FY 2007.

Allocation of Investments - Well-managed and cost-effective IT investments that promote enterprise collaboration.

- Increase the level of technical standardization across HUD IT by the FY 2008 Select.
- Allocate increased Development Maintenance and Enhancement (DME) funding share to support new capabilities/modernization as defined through segment architectures by the FY 2008 Select.
- Increase use of reusable components and shared services by the FY 2008 Select.
- Increase use of Commercial Off-the-Shelf (COTS) or Government Off-the-Shelf (GOTS) solutions across HUD by the FY 2008 Select.
- Improve IT program and project management capabilities by end of 4th quarter FY 2006.

Mission Impact - Relevant and robust IT that improves and increases the capabilities of HUD’s core Lines Of Business (LOBs) and functions.

- Define, prioritize, and sequence segment architectures around core LOBs and functions by end of 2nd quarter FY 2005.
- Integrate business and IT planning processes by end of 1st quarter FY 2006.

- Develop trusted partnerships in support of program area and IT collaboration by end of 1st quarter FY 2006.
- Develop and implement a comprehensive performance management framework by end of 1st quarter 2007.
- Collaboratively define business needs, functional requirements, and architectures with business and IT stakeholders by 3rd quarter FY 2007.

Information Delivery - Secure, rapid, and reliable data and information to our customers, citizens, and business partners.

- Transition and implement an Enterprise IT Disaster Recovery Facility by end of 4th quarter FY 2005.
- Secure and refresh HUD's infrastructure by 1st quarter 2006.
- Develop and implement an enterprise security program that meets all security and privacy-related regulations, statutes, and Federal laws by 1st quarter FY 2006.
- Implement the HUD-wide data quality management practice by end of 4th quarter FY 2006.
- Develop OCIO and program area partnerships in developing E-Government solutions by 4th quarter FY 2006.

3.4 ARCHITECTURAL DRIVERS

HUD Architectural Drivers are those factors that influence HUD's Target EA and architectural decision-making process. This section first provides a list of HUD's Architectural Drivers, followed by a thorough and detailed discussion that provides in-depth descriptions and implications for each driver.

3.4.1 Summary

HUD's Architectural Drivers are as follows:

1. Improve services to business partners
2. Respond to increased demand for HUD services amid reduced budgetary resources
3. Improve HUD financial controls
4. Address HUD's loss of human capital
5. Fulfill HUD's information security requirements
6. Improve controls and oversight to reduce housing discrimination
7. Enhance flexibility in responding to changing customer demographics
8. Respond to, and proactively participate in, government-wide drive for collaboration

3.4.2 Detail

The Architectural Drivers listed above have been described in greater detail below, with implications documented for each driver. Please note that the implications are not part of the drivers themselves. Rather, they add relevance and justification to the drivers, and begin building the bridge from the drivers to other artifacts such as the Common Requirement Vision and Conceptual Model, both key elements of the Conceptual Target EA (See Section 4).

3.4.2.1 Improve service to business partners.

Description:

- HUD's services are delivered to its end customers through an extensive distributed and decentralized network of tens of thousands of "down-channel business partners," including: Federal, state, local, and tribal agencies; mortgage lenders and other businesses; and public interest groups.

- HUD is improving its performance monitoring process to better assess its programs, and in turn, its business intermediaries' performance, by defining performance measures upfront that emphasize program outcome.

- HUD promotes "Maximum Feasible Citizen Involvement" through "locally defined" programs and grants administration, allowing local jurisdictions independence in deciding how to spend grant funds on initiatives most congruent with their needs.

- HUD is pursuing innovative ways and new business models to deliver value added services and information to partners and end customers. For example, when delivering grants, HUD will be proactive in exposing information on grantees on complementary grant programs.

- Executive Order 13279 "Equal protection of the Laws for faith based and community organizations" focuses on engaging faith-based and community organizations as key partners in HUD's community development initiatives.

Source(s): HUD 2003 – 2008 Strategic Plan, 2005 HUD Budget Summary, GAO Reports, HUD OIG Audit of HUD Financial Statements for 2003 and 2004, HUD Stakeholder Interviews.

Architectural Implications:

- Decentralized, distributed governance structure - Transfer more power out to HUD's field offices and downstream business partners, enabling greater control near customers.

- Policy development - Institute policies to allow for greater control and oversight of business partners.

- Control and oversight - Support data collection and analysis to perform business partner performance management.

- Flexibility – Develop and maintain a flexible EA that is able to respond to changing policy objectives, business partner relationships, business information and technology requirements.

- User friendly information access - Provide convenient partner access to HUD information and services.

- Platform independence - Because HUD's business is conducted in conjunction with many independent players, the optimal exchange of data will require an architecture that is platform independent.

- Data standardization and integration - Data standardization and integration are prerequisites to optimal data sharing, and HUD's interaction with its business partners as "One HUD".

3.4.2.2 Respond to increased demand for HUD services amid reduced budgetary resources.

Description:

- A constrained Federal Budget due to reduced tax inflows/revenue, shifting national priorities to defense and homeland security, and a budget deficit may result in a flat or even negative change in near-term HUD funding levels. Fixed or reduced funding, coupled with a growing demand for HUD services, will require HUD to improve operational efficiencies in order to deliver more with less.

- An increased demand for HUD services is caused by a confluence of several factors:

  – Rising poverty levels, stagnant wages, and a growing income gap-- all caused by the economic downturn, outsourcing of low skilled labor, and resultant unemployment-- increase the demand for affordable housing for low to medium income families, and housing and services for the homeless.

  – Declining low-income job prospects impact HUD's ability to transition HUD-assisted renters toward self-sufficiency, prolonging dependence on HUD assistance.

  – Rapidly increasing growth in home values has made the biggest obstacle to owning a home the ability to save enough for the down payment, resulting in the use of HUD subsidies for home ownership.

  - Building an “Ownership Society” where homeownership opportunities for all Americans are expanded, leveraging HUD resources and expertise to simplify the home buying process.

  - Rising interest rates increase costs of financing a home via private lending channels, creating a greater demand for HUD housing assistance (e.g., HUD subsidies, HUD loan insurance, etc.).

  - Large number of aging “Baby Boomers” will affect demand for affordable, decent elderly housing and assisted living programs.

- Being more responsive and entrepreneurial in the way it delivers its services, HUD is aiming to provide citizen’s with more than just housing-related information and services. HUD views itself as a liaison to communities, being the single transparent source of community related information by implementing mechanisms for publicizing complementary Federal programs. For example:

  - When delivering information on HIV/AIDS housing, HUD might also provide information on possible HIV/AIDS health programs or services sponsored by HHS, or.

  - When presenting information on community renewal projects, HUD might provide information on community cleanup programs supported through EPA.

- Affordable housing and employment locations often do not exist in close proximity of one another, forcing low income, low skilled workers to seek housing further away from their places of work.

Source(s): HUD 2003 – 2008 Strategic Plan, HUD Stakeholder Interviews.

Architectural Implications:

- Benchmarking - Benchmark other Federal agencies, the private sector, and other organizations to identify business best practices.

- Performance measures - Establish performance measures to evaluate “cost to deliver” services against program value.

- Partnership opportunities - Explore partnering opportunities with other Federal, state, and local agencies to provide services; this allows pooling of resources amid limited funding.

- Business process re-engineering - Streamline business processes to improve HUD's operational efficiencies.

- Citizen self-service – Implement alternative service distribution channels to provide enhanced access to HUD services.

- Electronic government - Promote the implementation and use of Federal E-Gov initiatives.

- Reduced complexity – Reduce the complexity of the IT environment to align with streamlined business processes and minimize IT maintenance costs.

3.4.2.3 Improve HUD financial controls.

Description:

- HUD will continue to improve its financial operations to meet Federal financial management requirements and Federal accounting standards by:

  – Upgrading and modernizing its internal systems and processes; or

  – Investigating opportunities to outsource this function.

- HUD will continue to strengthen its internal financial controls and performance management processes to ensure that business partners (e.g., housing intermediaries) are performing as expected, and to minimize questionable and fraudulent payment to business partners and citizens (e.g., subsidy overpayments, fraudulent repair payments, insurance overpayments, etc.).

Sources(s): HUD 2003 – 2008 Strategic Plan, 2005 HUD Budget Summary, GAO Reports, HUD OIG Audit of HUD Financial Statements for 2003 and 2004.

Architectural Implications:

- Business model modernization - Determine how best to evolve the business model (i.e., keep in house vs. outsource to a "Center of Excellence").

- Standardization - Develop standard financial management processes and tools (i.e., services), and data, which can be leveraged across the enterprise.

- Integration – Integrate enterprise-wide and program-specific financial management services and data

3.4.2.4 Address HUD's loss of human capital.

Description:

- HUD faces a serious shortage of Human Capital in coming years as many experienced senior staff and executives, who comprise a large percentage of total HUD personnel, retire.

Source(s): 2005 HUD Budget Summary.

Architectural Implications:

- Workforce modernization - Support a succession planning strategy that includes education, training, and professional development for HUD employees at all levels and incentives to retain top talent; and a recruiting strategy that attracts top candidates.

- Enterprise knowledge retention and utilization - Capture and make available enterprise-wide intellectual capital (e.g., tangible information such as documents, and intangible experiential knowledge).

3.4.2.5 Fulfill HUD's information security requirements.

Description:

- HUD implements risk-based security policy, providing controls and protection commensurate with the risk and magnitude of the harm

resulting from unauthorized access, use, disclosure, disruption, and/or modification to Department information technology assets.

- Legislative requirements, such as the Freedom of Information Act (FOIA) and the Health Insurance Portability and Accountability Act (HIPAA) bolster the need for vigilant security policy.

Sources(s): HUD EA Framework, HUD Computer Security Policy Handbook.

Architectural Implications:

- Robust security policy and measures - Increase the security of HUD business process and information assets as the Department conducts greater volumes of electronic business with its expanding network of business partners.

- Ubiquitous security – Security is inherent to the entire architecture, having "touch points" with all architectural layers and stakeholders.

3.4.2.6 Improve controls and oversight to reduce housing discrimination.

Description:

- Discrimination due to educational, economic and social differences creates difficulties for minorities to secure the income and credit history needed to become homeowners.

- Decisions locating developments in downtrodden areas perpetuate poverty and segregation.

Source(s): HUD 2003 – 2008 Strategic Plan, HUD Stakeholder Interviews.

Architectural Implications:

- Data collection and analysis - Improve data collection and analysis to support the identification of lending and renting patterns and the monitoring and evaluation of remedial actions.

3.4.2.7 Enhance flexibility in responding to changing customer demographics.

Description:

- An ever-increasing proportion of Hispanic citizens among the low-to-moderate income population necessitates that HUD make its services available in Spanish (e.g., web information and outreach material written in Spanish, Spanish speaking representatives/translators in business partner sites, etc.).
- HUD offers housing assistance and assisted living opportunities to the disabled.
- Economic factors, including rising unemployment and flat wages, will continue to increase poverty and subsequent demand for low income and homeless housing.

Source(s): 2000 US Census Study, HUD Stakeholder Interviews.

Architectural Implications:

- Universal information access and usability – Develop HUD's business processes, data standards, and tools to serve English and non-English speaking users.
- Multiple distribution channels - Enhance access to HUD services by all citizens via alternative distribution channels (e.g., kiosks, walk-in sites, mobile vans, Internet, mobile phones and other handheld devices, etc.).

3.4.2.8 Respond to, and proactively participate in, government-wide drive for collaboration.

Description:

- Use of electronic government and other government-wide initiatives, standards, and best practices to increase citizen access to information,

and implement and comply with core government processes (e.g., eGrants) and mandates (e.g. PMA), respectively.

Source(s): HUD 2003 – 2008 Strategic Plan, 2005 HUD Budget Summary.

Architectural Implications:

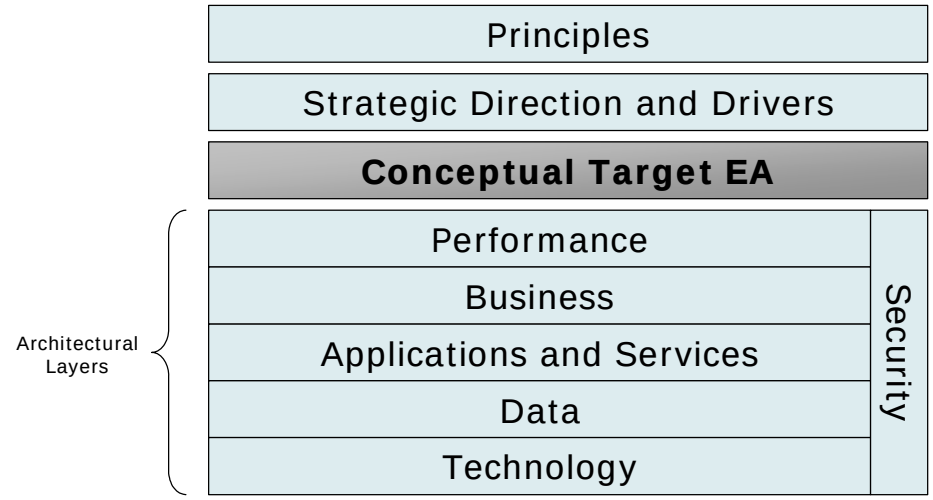
- Standardization and reuse – Participate in Federal E-Gov initiatives to identify opportunities for business process and data standardization, and for reuse across Federal agencies.
- Modernized IT infrastructure – Upgrade HUD infrastructure to newer standards, including IPv6, to accommodate anticipated increases in electronic transactions and data traffic from expanded Internet usage through a myriad of devices.

4 CONCEPTUAL TARGET EA

4.1 INTRODUCTION

The Conceptual Target EA builds on EA development and implementation guidance outlined by HUD's EA Principles. It also leverages HUD's strategic business and IT goals and objectives, which drive the development of the Target EA to provide a conceptual overview of HUD's desired end state environment. Exhibit 4-1 below shows how the Conceptual Target EA fits into the overall HUD Target EA framework.

Exhibit 4-1 – Target EA Framework: Conceptual Target EA



The purpose of this section is to establish a common understanding and sense of the direction HUD is taking with respect to its business operations and enabling technology environment, setting the foundation for the more detailed architectural layers that follow.

The Conceptual Target EA Vision consists of three basic elements:

- **Key Characteristics of the Target EA** – This section introduces several key concepts or characteristics of the Target EA that are fundamental to readers' understanding of the remaining sections of the Target EA document.

- **Common Requirements Vision (CRV)** – The CRV is a set of architectural requirements that are applicable across HUD. The CRV begins the translation of HUD's strategic direction and drivers into a set of common services that will be needed in the target environment.

- **Target EA Conceptual Model** – The Target EA Conceptual Model provides a high-level view of the entire HUD EA in a single graphical model. Through a series of illustrations, it allows stakeholders with varied responsibilities and organizational units within HUD to "find themselves" within the architecture and better understand how they may influence architectural decision-making and how the architecture may impact them.

4.2 KEY CHARACTERISTICS OF THE TARGET EA

Consistent with government and industry best practice, in particular the emphasis on service components in the FEA Service Component Reference Model (SRM), HUD has adopted a service-oriented and component-based approach to architecture. While there are many competing interpretations of what constitutes a service or component, we will not try to distinguish the technical definitions of "service" and "component". Rather, we will use the term **service component**, which is defined by the FEA as: *"self-contained business processes or services with predetermined functionality that may be exposed through a business or technology interface."*[4]

HUD believes that the crux of this approach is "build once, use often." To accomplish this, the functionality or capabilities of a business process or application must be separated out into distinct "services" or "components". Once components have been separated from their encompassing business processes or applications, they can be shared and reused across the enterprise by any business process or application.

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[4] *The Service Component Reference Model (SRM) Version 2.0, Federal Enterprise Architecture Program Management Office, June 2003.*

This stands in contrast to the current environment, in which each system or application contains a comprehensive set of unshared components needed to address a particular business purpose. In this way, a service component such as "reporting" is built into each system or application that needs it, often resulting in unnecessary duplication and cost. Another negative impact of this stove-piped environment is that the same component may be built into multiple systems or applications using different technologies, resulting in a proliferation of technologies and increased complexity.

The concepts of service-oriented and component-based architectures are not new ones; however, advances in technology have moved them from concept to reality. For example, only in the last few years, Web Services, which are an implementation of a Service-Oriented Architecture (SOA) that allows Web-based applications, and more specifically, their respective resident functionalities (e.g., Search, Reporting, Retrieve, etc.), residing in different locations or running on different operating systems, to communicate with one another using open standards over the Internet, have further evolved the practicality of SOAs. The recent widespread establishment of this set of Web Services-enabling open standards has allowed the proliferation of service oriented and component-based architectures throughout the private and public sectors as the emerging and preferred methodology for applications development.

Many well known companies such as Sun Microsystems, IBM, The Hartford Financial Service Group, and Cendant are leveraging the SOA approach for its most attractive characteristic-- reuse, where the ability to reuse code translates into quicker design, build, and deployment cycles for applications, with reduced development costs.[5]

In the public sector, specifically the Federal space, service-oriented and component-based architectures represent the general direction in which EA is headed. OMB's intention is that as Federal agencies develop their service-

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5 *"Web Services: Managing the Building Blocks", Computerworld, August, 2004.*

oriented EAs, they will begin to use them as tools to identify components across their enterprises that can be published in the Federal component registry, Core.gov., a type of "yellow pages" for components. Federal agencies can then access Core.gov to rapidly discover and assemble the business process and technology components they need to begin building applications that leverage existing pieces of code, or already designed business processes. This exemplifies the concept of sharing and reuse, and really achieves the goal of cost effective component-based applications development across the Government.

Community of Interest components represent an ideal solution in which common components can be used by multiple agencies that share similar business needs. For example, both HUD and HHS might share the same component that allows each department to build an application that delivers important information on housing or health programs to HIV/AIDS patients over the Internet.

Target EA V2.0 defines those service components that will be needed to support HUD's business in the target environment (see Section 6, Applications and Services Layer), irrespective of how the components will be implemented. Plans for deploying, implementing, and sharing service components across the Department and its extended enterprise (i.e., business partners, and other governmental entities) will be addressed through the Segment Architecture definition and EA Transition Plan development processes.

Service-oriented and component-based architectures have the following characteristics that typically result in reductions in cost, time spent per task, and the need for staff training:

Scalability: the capacity of a system, network or process to continue to meet user needs and expectations when it or its context is changed (either increased or decreased).

Interoperability: the ability for components, systems, or networks to communicate directly with each other without losing any content or context of the intended communication; minimizes the requirements for shared understanding and results in aggregated services being shared by parties other than the originators of the service.

Flexibility: the ability to provide new services, upgrade, or substitute services without affecting the enterprise's operations.

Innovation: the ability to decouple applications from specific business processes so applications can be combined and recombined in optimal and creative ways.

Reusability: any efficiency that has been designed into a particular system or process to enable existing physical, conceptual or procedural constructs to be implemented in other systems without modification.

Portability: the ability to operate individual software programs or hardware devices on multiple technology platforms without modification.

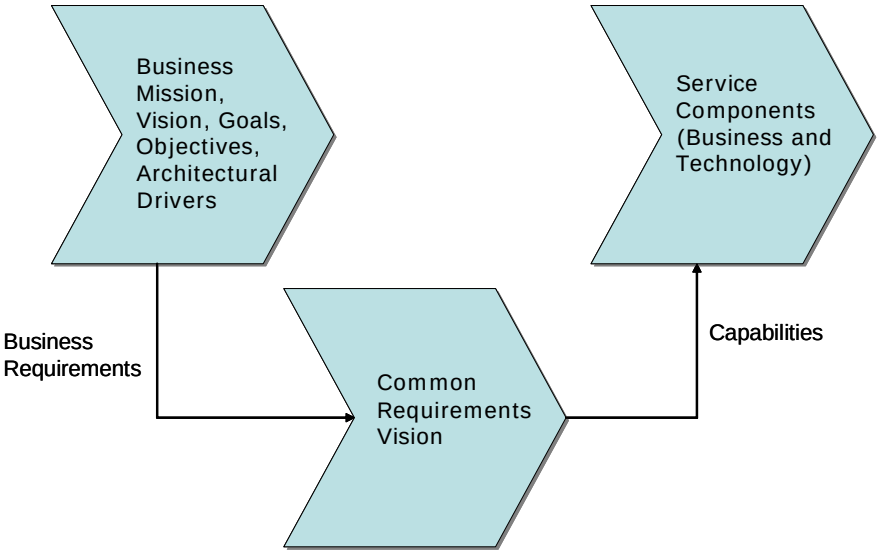
Reduced Complexity: The sharing and reuse of components by multiple applications and or processes limits the proliferation of different technology standards and reduces the number of technology resources, simplifying HUD's IT environment and asset management efforts.

Extensibility: A solution built from common components can be extended across different business functions, with each component providing a distinct capability that is shared among numerous related or unrelated business processes.

4.3 COMMON REQUIREMENTS VISION

The CRV builds a bridge from business needs to technology requirements delivered by components or services that will be needed in HUD's desired end state environment. Specifically, as depicted in Exhibit 4-2 below, the CRV analyzes elements of HUD's business strategy, such as its organizational mission, strategic vision, goals, objectives, and architectural drivers to arrive at a set of business requirements. The CRV then translates these business requirements into a set of capabilities that will be supplied by a set of service components, thus serving as a key input to development of HUD's Applications and Services Layer.

Exhibit 4-2- Common Requirements Vision



The CRV table in Exhibit 4-3 below provides the following information for each identified common requirement:

- **Description** – The description provides a narrative statement about the requirement.
- **Source** – The source ties the requirement back to the driver or factor from which it was derived. The major sources identified include:
  - *Driver* – Driver refers to the Architectural Drivers defined in Section 3.
  - *CRV Revision 2* – This earlier version of the CRV (January 2003) is a work product that the EA practice created and published prior to the development of Target EA V2.0. It was an important source for the development of these requirements.
  - *HUD Strategic Plan* – HUD Strategic Plan refers to goals and objectives defined in the *HUD Strategic Plan, FY 2003-FY 2008*.
  - *IT Strategic Plan* – IT Strategic Plan refers to goals and objectives defined in the *HUD IT Strategic Plan, FY 2005-FY 2010*.

- **Capabilities** – For each requirement, HUD has identified an initial set of capabilities that could potentially support fulfillment of the requirement. In most cases, these capabilities correspond to service components as described in Section 4.2 above. The identification of service components linked to these common requirements was an important input to the final set of target service components defined in Section 6.

Exhibit 4-3 – Common Requirements Vision

Common Requirement: Ease of Use and Consistent End-User Experience		
Description	**Source**	**Capabilities**
HUD will employ a variety of services designed to make citizen and partner interactions more efficient and consistent. In addition, HUD's Target EA will allow users and groups flexibility and personalization when composing user interfaces. HUD will adopt standards for style and development (i.e., common look and feel), as well as a standard application development environment.	Driver – Improve services to business partners Driver – Respond to increased demand for HUD services amid reduced budgetary resources Driver – Enhance flexibility in responding to changing customer demographics CRV Revision 2 – Develop and implement internet information presentation standards CRV Revision 2 – Ease of use is a paramount design principle	Standardized User Interfaces (i.e. Common Look and Feel); Enterprise Portal and Portlets; Search; Personalization; Subscriptions; Alerts and Notifications; Contact and Profile Management; Online Help; Online Tutorials; Self-Service; Reservations/ Registration; Multi-Lingual Support; Assistance Request; Scheduling

Common Requirement: Integrated Outreach, Marketing, and Communications		
Description	**Source**	**Capabilities**
To more effectively communicate with external and internal stakeholders, HUD will provide information through multiple access channels and methods, employ push and pull technologies, and take a "One HUD" approach to branding HUD information products.	Driver – Respond to increased demand for HUD services amid reduced budgetary resources Driver – Improve services to business partners Driver – Enhance flexibility in responding to changing customer demographics HUD Strategic Plan – Improve internal communications and employee involvement	Event/ News Management; Community Management; Content Authoring; Content Review and Approval; Tagging and Aggregation; Content Publishing and Delivery; Syndication Management; Correspondence Management; Enterprise Portal and Portlets; Brand Management; Customer Feedback; Surveys; Email; Access Channels (Browser, PDA, Mobile Telephone, Interactive Voice Recognition, etc.)

Common Requirement: Business Partner Communication Management		
Description	**Source**	**Capabilities**
HUD's services are delivered to citizens through an extensive network of "down-channel business partners," including Federal, state, local, and tribal agencies; mortgage lenders and other businesses; and public interest groups. Business Partner Communication Management provides all HUD programs with the ability to more effectively maintain and use information about their partners, and exchange information with those partners.	Driver - Improve services to business partners CRV Revision 2 – Develop an infrastructure for data sharing CRV Revision 2 – Create and implement systems infrastructure for improved data collection by HUD partners and grantees CRV Revision 2 – Implement infrastructure for delivering community-based information to business partners CRV Revision 2 – Develop an infrastructure for utilizing and sharing fair housing compliance data	Partner Relationship Management; Contact Management; Enterprise Portal and Portlets; Process Tracking; Case/ Issue Management; Correspondence Management; Workgroup/ Groupware; Platform-Independent applications development (i.e. J2EE distributed computing architecture framework); Data Interchange

Common Requirement: Business Partner Performance Management, Controls, and Oversight		
Description	**Source**	**Capabilities**
As with all Federal agencies, HUD must maintain close oversight for the programs and funds for which it is responsible. However, because of HUD's highly distributed service delivery model, it is challenging for HUD to ensure that its programs are successful. HUD's Target EA will provide an integrated suite of services to help HUD improve performance management, control, and oversight of its business partners.	HUD Strategic Plan – Improve HUD's management, internal controls and systems and resolve audit issues Driver- Improve services to business partners; Support data collection and analysis to perform business partner performance management Driver- Improve controls and oversight to reduce housing discrimination CRV Revision 2- Develop an enterprise performance reporting capability CRV Revision 2 – Develop program tracking and performance measurement infrastructure CRV Revision 2 – Design and develop financial management systems at the enterprise level CRV Revision 2 – Develop enterprise decision support and business intelligence capability	Performance Management; Decision Support and Planning; Balanced Scorecard; Data Mining; Data Integration; Reporting; Online Analytical Processing (OLAP); Auditing; Financial Reporting; Activity-Based Management; Data Exchange; Information Retrieval, Real-Time Data Access

Common Requirement: Integrated Data Services Architecture		
Description	**Source**	**Capabilities**
HUD's Target EA will allow open access to HUD's information based on consistently applied data definitions and data access control. The Integrated Data Services Architecture will move HUD from application-specific or "silo" data to data maintained independently from applications. The architecture will provide mechanisms for transforming transactional data into a data warehouse configuration with subject-oriented data marts based on user reporting and research requirements. This will allow users to quickly and accurately research and report using data sets pulled from numerous data sources.	Driver – Improve services to business partners Driver – Respond to increased demand for HUD services amid reduced budgetary resources Driver- Improve controls and oversight to reduce housing discrimination Driver – Enhance flexibility in responding to changing customer demographics CRV Revision 2 – Implement data analysis tools and data warehousing technology at the enterprise level CRV Revision 2 – Develop and implement a metadata management infrastructure CRV Revision 2 – Develop a decision support and data warehousing infrastructure CRV Revision 2 – Develop an infrastructure for data sharing	Data Exchange; Data Mart; Data Warehouse; Meta Data Management; Data Cleansing; Extraction and Transformation; Loading and Archiving; Data Recovery; Data Classification; Data Mining; Data Integration; Reporting; Online Analytical Processing (OLAP); Relational Database Management System

Common Requirement: Enterprise Electronic Document and Records Management		
Description	**Source**	**Capabilities**
HUD will be able to effectively manage all of its documents and records in a consistent, logical manner, from creation to final disposition, using a common set of tools, standards, and policies. Migration to electronic document management allows multi-user access to documents.	Driver – Address HUD's loss of human capital Driver – Respond to increased demand for HUD services amid reduced budgetary resources	Document Imaging and OCR; Document Referencing; Document Revisions; Library/ Storage; Document Review and Approval; Document Conversion; Indexing; Document Classification; Record Linking/ Association; Document Retirement; Digital Rights Management; Information Sharing

Common Requirement: Enterprise Knowledge Management and Sharing		
Description	**Source**	**Capabilities**
HUD will employ processes and tools to capture and make available enterprise-wide intellectual capital, including both tangible knowledge in the form of documents and intangible experiential knowledge. Participation in Communities of Practice, where content is aggregated around common interests, will promote collaboration and knowledge sharing both within HUD and across the Federal Government.	Driver- Address HUD's loss of human capital Driver – Respond to increased demand for HUD services amid reduced budgetary resources Driver – Improve services to business partners CRV Revision 2- Develop and implement a knowledge management infrastructure	Information Retrieval; Information Mapping/ Taxonomy; Information Sharing; Categorization; Knowledge Engineering; Knowledge Capture; Knowledge Discovery; Knowledge Distribution and Delivery; Search; Data Warehouse; Data Exchange; Data Mart; Data Mining; Community Management

Common Requirement: Geospatial Data Management and Analysis		
Description	**Source**	**Capabilities**
HUD will integrate geospatial and geographic information services with data management and analytical capabilities to provide users with the ability to capture, view, and analyze programmatic information based on location and associated characteristics.	HUD Strategic Plan – Help organizations access the resources they need to make their communities more livable Driver – Respond to increased demand for HUD services amid reduced budgetary resources Driver – Improve services to business partners CRV Revision 2 – Develop and implement enterprise-wide GIS CRV Revision 2 – Implement standard geospatial and demographic tools and data at the enterprise level	Mapping/ Geospatial (GIS)/ Elevation/ GPS; Graphing/ Charting; Data Warehouse; Data Marts; Decision Support and Planning; Data Mining; Modeling; Predictive; Simulation; Mathematical; Reporting; Online Analytical Processing (OLAP)

Common Requirement: Enterprise Financial Management		
Description	**Source**	**Capabilities**
HUD's Enterprise Financial Management will result in a core suite of accounting and finance services to manage the flow of financial information across HUD's information systems and ensure compliance with the Joint Financial Management Improvement Program (JFMIP) requirements.	HUD Strategic Plan – Improve HUD's management, internal controls and systems and resolve audit issues Driver – Improve HUD financial control CRV Revision 2 – Design and develop financial management systems at the enterprise level CRV Revision 2 – Create and implement systems infrastructure for improved financial management	Billing and Accounting; Credit/ Charge; Expense Management; Payroll; Payment/ Settlement; Internal Controls; Debt Collection; Revenue Management; Auditing; Activity; Currency Translation; Financial Reporting

Common Requirement: Enterprise Human Resource Management		
Description	**Source**	**Capabilities**
Enterprise Human Resource Management will encompass a comprehensive suite of processes, services, and technologies to fully support the management of human resources. It will make all HR information available to managers and supervisors for planning and employee development and will help to ensure that HUD employees are used in the most effective manner possible.	HUD Strategic Plan – Rebuild HUD's human capital and further diversify its workforce Driver – Address HUD's loss of human capital CRV Revision 2 – Implement an integrated HR system	Recruiting; Resume Management; Career Development and Retention; Time Reporting; Awards Management; Benefits Management; Retirement Management; Personnel Administration; Education/ Training; Health and Safety; Travel Management; Resource Planning and Allocation; Skills Management; Workforce Directory/ Locator; Workforce Acquisition/ Optimization

Common Requirement: Online Training		
Description	**Source**	**Capabilities**
Online Training will allow HUD to respond to the call to do more with less, the outflow of experienced staff, and changes in needed skill sets by more efficiently delivering training to HUD staff. Online training employs web technologies and a variety of media to deliver quality training to staff anywhere and anytime. While online training is primarily focused on training for HUD employees, the services will also be used to train partners and citizens as appropriate.	HUD Strategic Plan – Rebuild HUD's human capital and further diversify its workforce Driver – Address HUD's loss of human capital Driver – Respond to increased demand for HUD services amid reduced budgetary resources Driver – Improve services to business partners	Education/ Training; Skills Management; Multimedia; High-Bandwidth Networking; Enterprise Portal and Portlets; Email; Threaded Discussions; Document Library

Common Requirement: Policy Development		
Description	**Source**	**Capabilities**
HUD will employ an integrated set of processes and services to support the development, review, and clearance of Departmental policies and regulations.	Driver – Improve services to business partners Driver – Respond to increased demand for HUD services amid reduced budgetary resources	Email; Threaded Discussions; Document Library; Shared Calendaring; Task Management; Process Tracking; Case/ Issue Management; Conflict Resolution; Correspondence Management; Workgroup/ Groupware; Document Review and Approval; Indexing; Classification

Common Requirement: Research Support		
Description	**Source**	**Capabilities**
In support of HUD's research function, HUD's EA will encompass an integrated set of business analytical, data management, knowledge management, business intelligence, and reporting services.	Driver – Improve controls and oversight to reduce housing discrimination CRV Revision 2 – Support research and development for mortgage insurance decision-making	Modeling; Predictive; Simulation; Mathematical; Multimedia; Graphing/ Charting; Mapping/ Geospatial (GIS)/ Elevation/ GPS; Data Warehouse; Decision Support and Planning; Data Mining; Reporting; Online Analytical Processing (OLAP); Information Retrieval; Information Sharing; Knowledge Capture; Surveys; Facilities Management

Common Requirement: Enterprise Security and Privacy Architecture		
Description	**Source**	**Capabilities**
Security and privacy will be integrated into all layers of HUD's EA. HUD will take a comprehensive view of security and privacy, from policy to technology, and will ensure compliance with all relevant requirements, including FISMA, NIST guidelines, and OMB guidance.	Driver- Fulfill HUD's information security requirements IT Strategic Plan – Develop and implement an enterprise security program that meets all security and privacy-related regulations, statutes, and Federal laws by 1st quarter FY 2006.	Identification and Authentication; Access Control; Encryption; Intrusion Detection; Verification; Digital Signature; User Management; Role/ Privilege Management; Audit Trail Capture and Analysis

Common Requirement: Centrally Managed Single User Identity		
Description	**Source**	**Capabilities**
HUD's EA will feature an authoritative source of user information based on an open set of directory services standards that will be centrally managed and administered.	Driver – Fulfill HUD's information security requirements Other – Benefits of centrally managed directory services include: securing HUD's computing environment; managing user identities; enabling role-based authorization and authentication of access to system and data resources; enabling single sign-on; and allowing the addition, deletion, or modification of user information in multiple systems	User Management; Role/Privilege Management; Identification and Authentication; Access Control; Directory Services

Common Requirement: Continuity of Operations (COOP), Continuity of Government (COG), and Disaster Recovery Management		
Description	**Source**	**Capabilities**
HUD will take an integrated enterprise-wide approach to COOP/COG and Disaster Recovery Management to ensure that HUD is able to stay up and running even in the event of planned or unplanned network failures due to system malfunctions, human errors, or malicious acts.	CRV Revision 2 – Develop an infrastructure for emergency information distribution CRV Revision 2 – Build a business continuity infrastructure OMB Passback – Deploy the Disaster Management Initiative's Disaster Management Interoperability Services toolset and integrate within each Emergency Operations center (EOC). Send and receive alert messages using common alert protocol standard. Acquire technology with IPv6.	Site Recovery; Site/ Datacenter Failover; High Availability Systems; Disaster Recovery; Data Backup and Restore; Continuous Data Access; Application Failover/ Load Balancing; Redundant Systems; IPv6

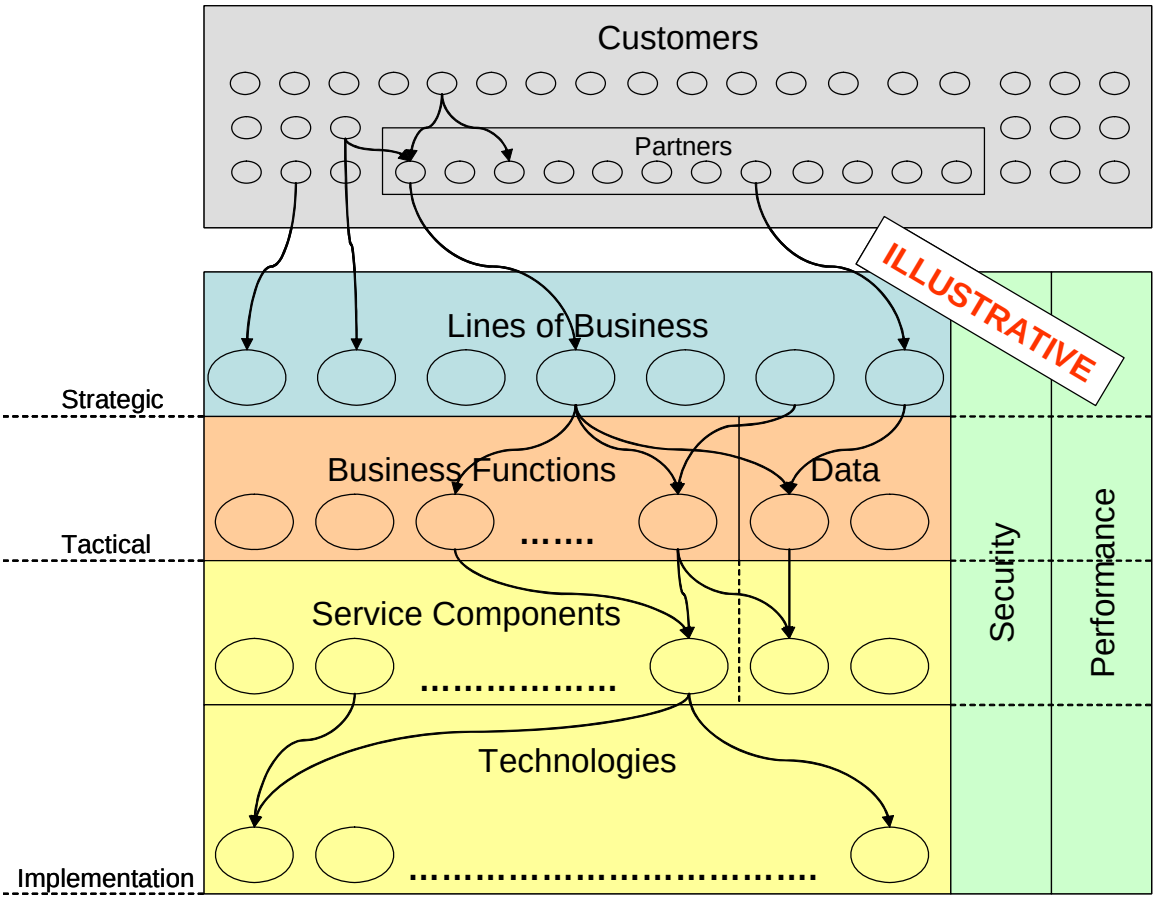
Common Requirement: Integrated Information Management		
Description	**Source**	**Capabilities**
HUD requires an integrated end-to-end process and toolset in support of the information management function and the IT Lifecycle Framework. As HUD's EA becomes more defined, the Department will move toward a comprehensive suite of processes and tools aligned with the target technology environment.	HUD Strategic Plan – Improve HUD's management and internal controls accountability CRV Revision 2 – Integrate IT processes around core SDLC management CRV Revision 2 – Integrate ITIM with the EA practice CRV Revision 2 – Invest in appropriate enterprise systems and infrastructure to support program management and internal operations	Change Management; Configuration Management; Requirements Management; Program/Project Management; Governance/ Policy Management; Quality Management; Business Rule Management; Risk Management; Network Management; Strategic Planning and Management; Portfolio Management; Performance Management; Legacy Integration; Enterprise Application Integration; Data Integration; Instrumentation and Testing; Software Development

4.4 TARGET EA CONCEPTUAL MODEL

The Target EA Conceptual Model provides a high-level view of the entire HUD EA in a single graphical model. It is intended to provide context to readers and users of EA by showing how the various perspectives of HUD that EA provides (e.g. line of business, function, service, technology, etc.) relate and interact with one another. In this section, we provide several versions of the conceptual model, each of which helps to explain a different EA concept or characteristic.

The basic Conceptual Model, Exhibit 4-4 below, represents HUD's Target EA framework and the relationships between the elements of the framework.

Exhibit 4-4 – Target EA Conceptual Model – Framework



The elements of the framework and the key relationships associated with them are summarized briefly below:

- **Customers** – HUD exists to serve a broad range of customers. A customer is any individual or organization that uses a service or product provided by HUD. There are many types of customers that use HUD's services, including citizens, businesses, other government agencies, and HUD employees. As illustrated in the framework, there are two primary means by which customers receive HUD products and services, either directly from HUD or indirectly through one of HUD's partners.

- **Partners** – Many of HUD's services are provided through a network of business partners. A partner is any organization that has a formal relationship with HUD focused on the delivery of HUD products and services or fulfillment of HUD's mission. HUD has tens of thousands of partners, including businesses, other government agencies, and not-for-profit and public interest groups. Partners are nested within the Customers box in the framework because the organizations that partner with HUD may have multiple distinct relationships or roles with respect to HUD. In some cases, the organization may be a partner in fulfilling HUD's mission. In other cases, it may be a customer using a HUD service.

- **Lines of Business** – HUD's LOBs represent a strategic view of HUD's business. Each LOB provides a unique set of business services to customers and plays a unique role in fulfillment of HUD's mission (e.g. Single Family Housing). LOBs provide business services to customers either directly or through a partner. In order to provide business services, LOBs perform a set of business functions. HUD's LOBs are defined fully in the Business Layer, Section 5.

- **Business Functions** – Business functions are high-level aggregations of related business processes and activities (e.g. Grants Management, Loan Insurance, and Human Resources Management). They represent the tactical view of HUD's business, as they are not uniquely associated with a specific mission area, but represent how things get done. A single LOB is typically supported by multiple business functions. Likewise, a single business function may be performed within or support multiple LOBs. In fact, many HUD business functions (e.g. HR Management, Financial Management, etc.) support all of

HUD's LOBs. HUD's business functions are defined fully in the Business Layer, Section 5.

- **Data** – HUD's data assets are "*information, especially facts or numbers, collected for examination and consideration and used to help decision-making*."[6] HUD data are created, used, and managed through the performance of business functions in support of LOBs. HUD's data layer is presented in Section 7.

- **Service Components** – HUD's service components are "self-contained business processes or services with predetermined functionality that may be exposed through a business or technology interface… The effective identification, assembly, and usage of components allows for aggregate services to be shared across agencies and governments."[7] In HUD's Target EA framework, service components represent the functionality traditionally associated with HUD's applications (e.g. case/ issue management, decision support). It is envisioned that HUD's legacy applications will over time be replaced by coupling logical sets of service components to capture, store, and manipulate data in support of HUD's business. As illustrated in the graphic, a single business function is typically supported by multiple service components. Likewise, a single service component may be used to support multiple business functions. HUD's service components are defined fully in the Applications and Services Layer, Section 6.

- **Technologies** – HUD's technology layer consists of "the standards, specifications, and technologies that collectively support the secure delivery, exchange, and construction of business and application

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6 *Cambridge Advanced Learner's Dictionary, Cambridge University Press, 2004.*

7 *The Service Component Reference Model (SRM) Version 2.0, Federal Enterprise Architecture Program Management Office, June 2003.*

components (service components)."[8] As illustrated in the graphic, a single service component may use multiple technologies. Likewise, a single technology may support multiple service components. HUD's technologies are defined fully in the Technology Layer, Section 8.

- **Security** – Security in the Target EA is represented as a cross-cutting set of policies, processes, service components, and technologies. It is integrated into each of the horizontal sections or architectural layers depicted in the framework. For example, LOBs must define policies and procedures for managing sensitive data, based on the level of sensitivity associated with the data. Within HUD's business functions, "IT Security" is addressed within the Information and Technology Management function. Within HUD's service components, "Security Management" is a service type consisting of numerous security-related service components. Finally, in the Technology Layer, "Security" is a service category consisting of security-related technologies.

- **Performance** – Performance in the Target EA is represented as being integrated into each of the horizontal sections or architectural layers depicted in the framework. Performance considerations will be addressed in each layer through the Segment Architecture development process, as described in Sections 1.6 and 1.7. As Segment Architectures are completed, performance information will be rolled up at the enterprise level, eventually forming an enterprise-wide performance reference model.

The version of the Conceptual Model depicted in Exhibit 4-5 below is a partial depiction of the populated model. This view is illustrative, as it would not be practical to show a fully populated model across all views. The Line of Business view is fully populated with HUD's LOBs (as defined in the Business

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[8] *The Technical Reference Model (TRM) Version 1.1, Federal Enterprise Architecture Program Management Office, August 2003.*

Layer, Section 5), but the other views represent subsets of the full architecture.

Exhibit 4-5 – Target EA Conceptual Model – Illustrative

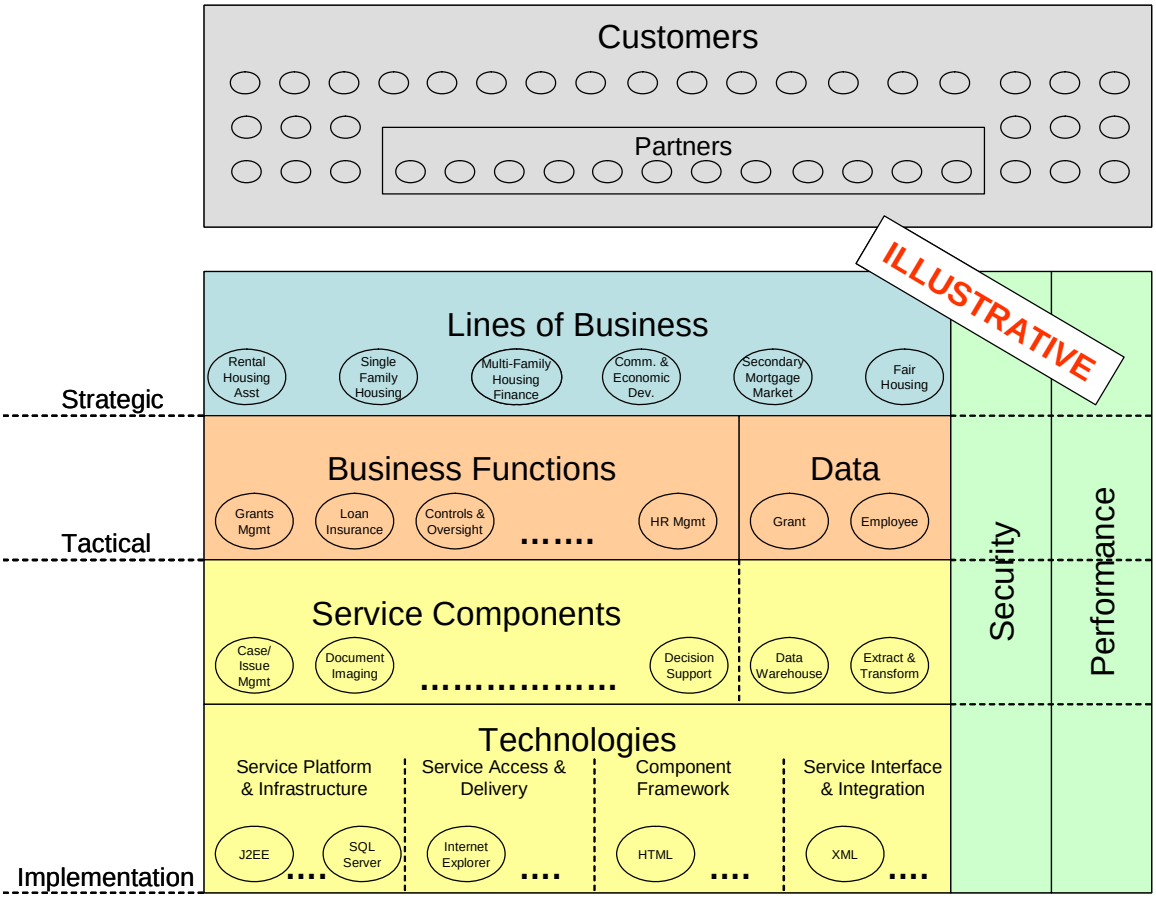


Exhibit 4-6 depicts a generic template that can be used by any organization or individual in HUD to construct a specific scenario that is congruent with an individual mission or area of focus, representing any customer (internal or external) interaction with the Department. Used in tandem, the template and the conceptual model graphic help to illustrate the relationship between the different elements of the model and specifically, the linkages between a specific customer need or request and the technology specification required to fulfill it.

Exhibit 4-6 – Sample Scenario Summary Template

Scenario:		
WHO?: Customer	Answers who is the requesting party desiring HUD services. A customer can be a private citizen, a HUD partner, or a HUD employee.	
WHAT?: Business Service	Answers what type of service is being requested by the customer (e.g., funding, counseling, etc.).	
HOW?	Partner	Answers which one of HUD's business partners is the Customer directly interfacing with to obtain the service.
	LOB	Answers through which of its LOBs HUD provides the service.
	Business Functions	Answers which business functions support the HUD LOB which will deliver the business service being requested.
	Data	Answers what types of data the business functions will utilize in their processes and activities in support of the LOBs.
	Service Components	Answers which service components are required to provide the necessary functionalities or capabilities needed to deliver the requested business service
	Technologies	Answers which technology standards, specifications, or products are needed to support operation of the service components.

The template has been structured to provide an easy-to-use tool that can be easily populated and a scenario easily built by answering a few simple questions. First, the user must identify business partners, citizens and internal customers ***who*** are requesting the business service from HUD. The second part of building a scenario is to determine ***what*** type of business service is being requested by the customer. A business service may include monetary assistance in the form of vouchers or grants, counseling, shelter, or even medical attention. Once the business service, or the *what*, has been identified, the next question to answer is ***how*** HUD will deliver the

requested business service to the end customer. Collectively, the Partner, LOBs, Business Functions, Data, Service Components, and Technologies rows of the template detail *how* HUD will deliver its services to the requesting customer. HUD may partner with business intermediaries, or deliver its service directly to customers. The business partners interact with specific HUD LOBs, which are supported by numerous business functions. These business functions process certain types of data in order to carry out their sub processes and activities in support of the LOBs. Service components provide the technical functionality to process the data, and technology encompasses those standards and specifications upon which the service components operate.

While the model provides users of EA with a better understanding of the elements of the Target EA and their relationships, it does not capture the elegance of the "line of sight" inherent in this holistic approach to modeling HUD IT's role in supporting service provision. Through the following series of three scenarios, the model is tailored to allow stakeholders with varied responsibilities and organizational alignments within HUD to "find themselves" within the architecture and better understand how they may influence architectural decision-making and how the architecture may impact them.

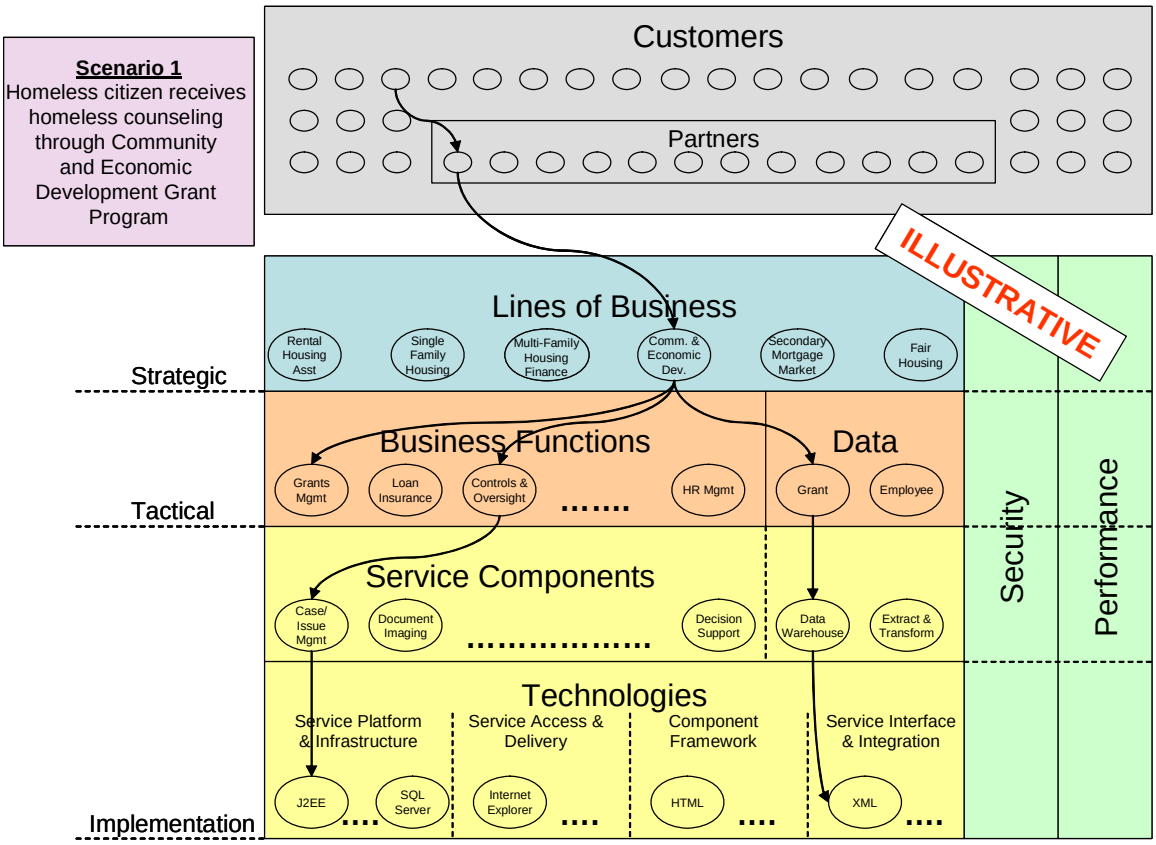
Scenario 1

Exhibit 4-7 captures the details of the first scenario, with a graphical depiction in Exhibit 4-8. Note: the scenarios do not represent all potential branches through the model for this service; they simply provide a subset of the functions, service components and technologies that may be used.

Exhibit 4-7 – Scenario Summary - Scenario 1

Scenario 1: Homeless Assistance		
Scenario Overview	A homeless citizen receives homeless counseling from a local homeless assistance organization.	
WHO? (Customer)	Homeless citizen	
WHAT? (Business Service)	The citizen receives counseling on where to find temporary or permanent housing services for homeless individuals.	
HOW?	**Partner**	The citizen interacts directly with the local housing agency, a HUD partner, with no direct interaction with HUD.
	LOB	The homeless assistance organization interacts with HUD through the Community and Economic Development LOB.
	Business Functions	The Community and Economic Development LOB funds the homeless assistance organization through the Community Development Block Grants program administered through the **Grants Management** business function. In addition, in order to ensure that the partner is operating within its obligations under the grant, the Community and Economic Development LOB also performs the **Controls & Oversight** function.
	Data	The Community and Economic Development LOB creates, uses, and manages grants data.
	Service Components	The Community and Economic Development LOB uses a HUD enterprise Case/ Issue Management service component and a Data Warehouse.
	Technologies	The Case/Issue Management capability is supported by a platform-independent distributed computing architecture known as Java 2 Enterprise Edition (J2EE). The Data Warehouse components uses the Extensible Markup Language (XML).

Exhibit 4-8 – Target EA Conceptual Model – Scenario 1



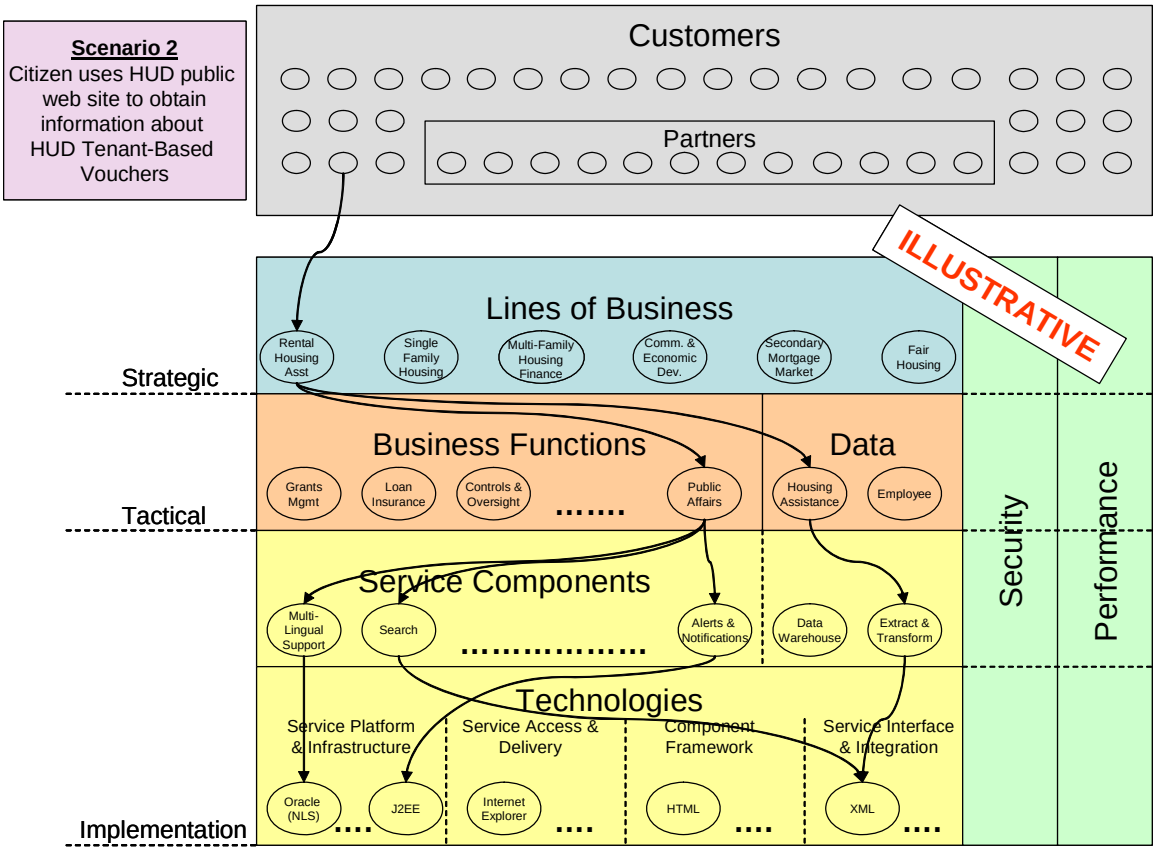
Scenario 2

The details of Scenario 2 are provided in Exhibit 4-9 and the scenario is depicted graphically in Exhibit 4-10. Note: the scenarios do not represent all potential branches through the model for this service; they simply provides a subset of the functions, service components and technologies that may be used.

Exhibit 4-9 – Scenario Summary - Scenario 2

Scenario 2: Rental Housing Information		
Scenario Overview	A citizen uses the HUD public web site to obtain information about HUD Tenant-Based Voucher programs.	
WHO? (Customer)	Citizen	
WHAT? (Business Service)	Information about HUD Tenant-Based Voucher programs.	
HOW?	**Partner**	No partner. Citizen receives information directly from public HUD website.
	LOB	Rental Housing Assistance
	Business Functions	The Rental Housing Assistance LOB performs the Public Affairs function to provide timely and relevant information over the web.
	Data	In performing the Public Affairs function, the Rental Housing Assistance LOB creates, uses, and manages housing assistance data (i.e. information about Tenant-Based Voucher programs).
	Service Components	In support of the Public Affairs function, the Rental Housing Assistance LOB uses a number of service components, including Search, Multi-lingual Support, Alerts & Notifications, and Extract & Transform.
	Technologies	These capabilities are in turn supported by technologies, such as Oracle's National Language Support (NLS) for multi-lingual support, XML to support the search component, and J2EE's framework for alerts and notifications.

Exhibit 4-10 – Target EA Conceptual Model – Scenario 2



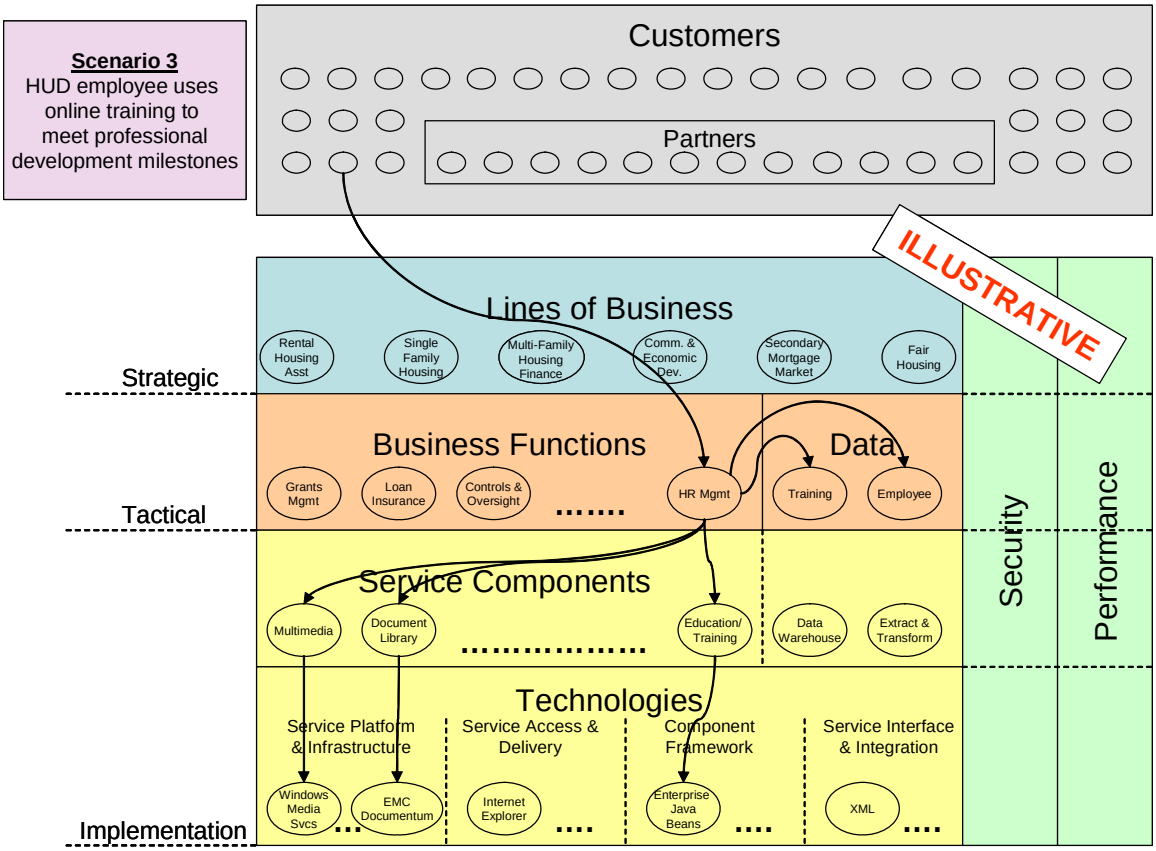
Scenario 3

The details of Scenario 3 are provided in Exhibit 4-11 and the scenario is depicted graphically in Exhibit 4-12. Note: the scenarios do not represent all potential branches through the model for this service; they simply provide a subset of the functions, service components and technologies that may be used.

Exhibit 4-11 – Scenario Summary – Scenario 3

Scenario 3: Online Training		
Scenario Overview	A HUD employee uses online training, most likely through the HUD intranet, to meet professional development milestones.	
WHO? (Customer)	HUD Employee	
WHAT? (Business Service)	Online training modules for self-administered professional development.	
HOW?	**Partner**	No partner. HUD employee accessed online training through employee training portal HUD Intranet.
	LOB	None. Human Resources Management business function is a cross-cutting function, supporting all LOBs.
	Business Functions	The employee is participating in an activity governed by the Human Resources Management (HR) function.
	Data	In providing this service, the HR function creates, uses, and manages employee data and training data.
	Service Components	Through a user-friendly employee portal on HUD's intranet, the employee directly interfaces with the training modules, which use a number of service components, including Education/ Training, Document Library, and Multimedia (e.g. streaming video).
	Technologies	These capabilities are supported by technologies, such as Enterprise Java Beans business logic to support interactive training, the Windows Media Services service platform for streaming video, and EMC Documentum to support the document library.

Exhibit 4-12 – Target EA Conceptual Model – Scenario 3

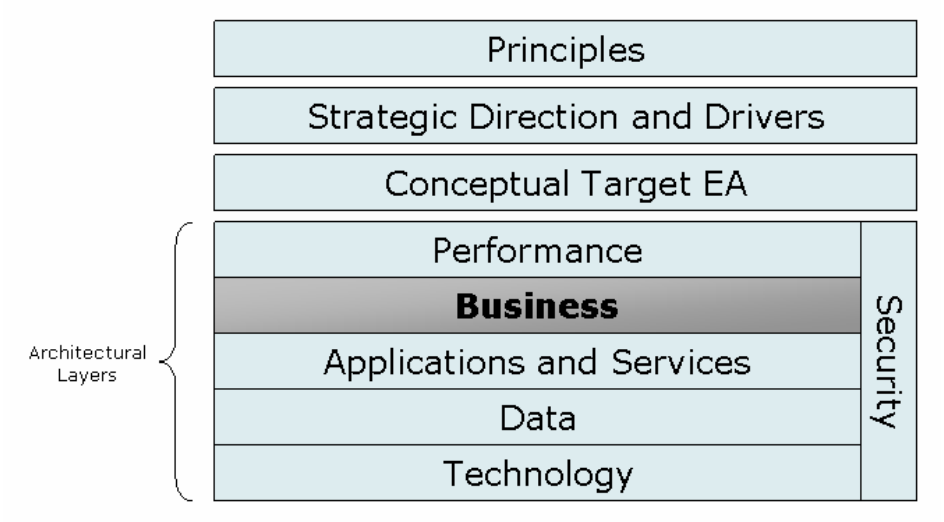


5 BUSINESS LAYER

5.1 INTRODUCTION

HUD's target Business Layer provides a functional view of HUD's business and aligns to the mission and strategic goals of the Department. The HUD Business Layer provides the foundation for the rest of EA layer relationships and does not reflect a major departure from the way HUD currently does business. This is attributed to the fact that HUD's business (i.e. what HUD does) has proven to be relatively stable over time. The next layer, the applications and services layer, will provide the information processing capabilities needed to support HUD's business. Exhibit 5-1 below shows how the Business Layer fits into the overall HUD Target EA framework.

Exhibit 5-1- Target EA Framework: Business



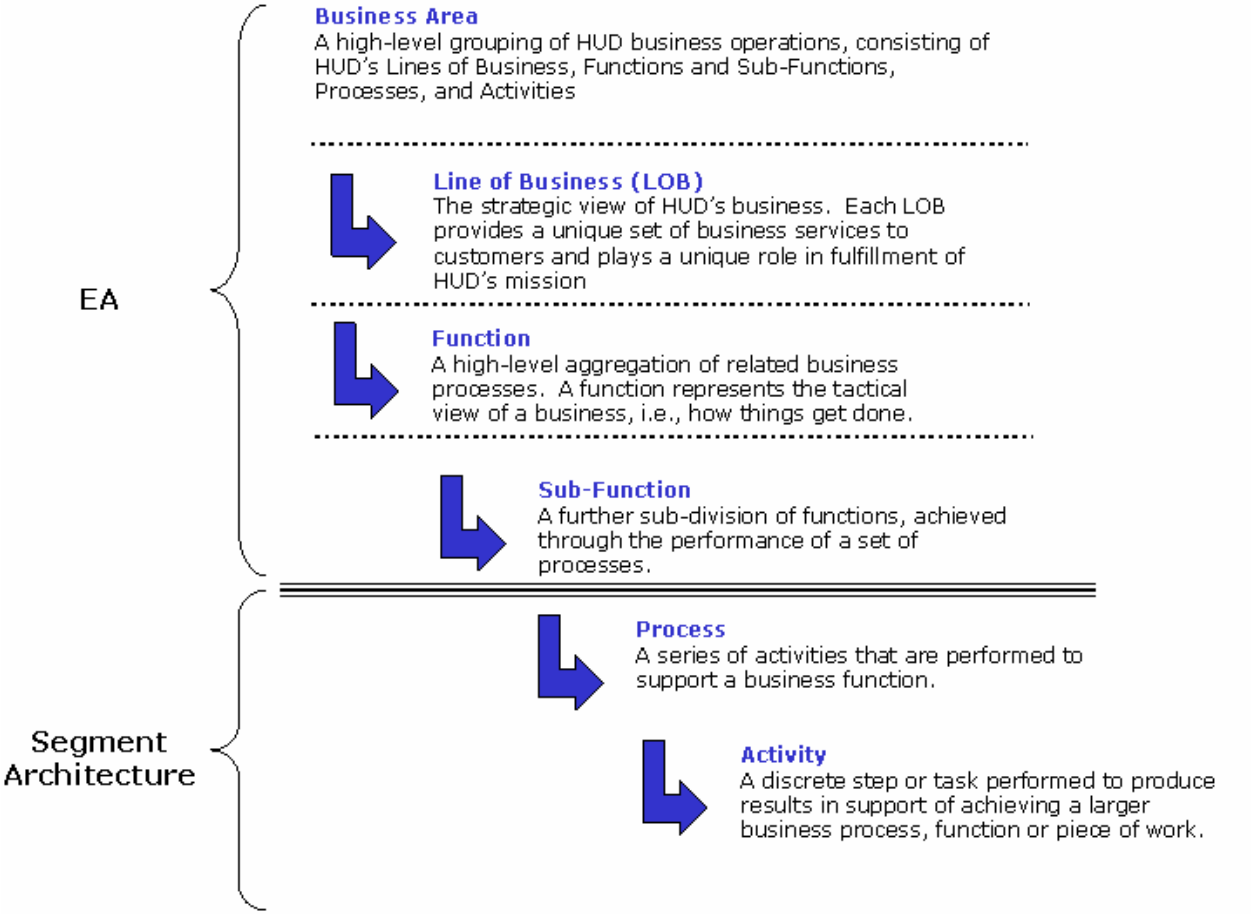
The HUD Business Layer is defined through the HUD Business Reference Model (BRM). The purpose of the BRM is to assist in the standardization of the terminology used to describe HUD's business Department-wide. This serves as a framework in which to evaluate HUD's business and the relationship of the business to other layers of the architecture (i.e. performance, data, services, and technology). Analysis supported by the BRM facilitates:

- Development of an EA Transition Plan, which sequences transition activities based on business priorities and dependencies.
- Consolidation, reduction, or standardization of duplicate or common business functions/sub-functions.
- Sharing of best practices across similar business functions/sub-functions.
- Reengineering and modernization of business functions/sub-functions.
- Sharing and reuse of common resources in support of multiple business functions/sub-functions.

5.2 HUD BUSINESS REFERENCE MODEL HIERARCHY

The HUD BRM defines HUD's business through the sub-function level, as Exhibit 5-2 illustrates. Additional detailing of the processes and activities that make up each sub-function is undertaken through HUD's segment architecture efforts. Through each segment architecture effort, functions are decomposed into supporting processes and activities.

Exhibit 5-2 – Business Reference Model Hierarchy



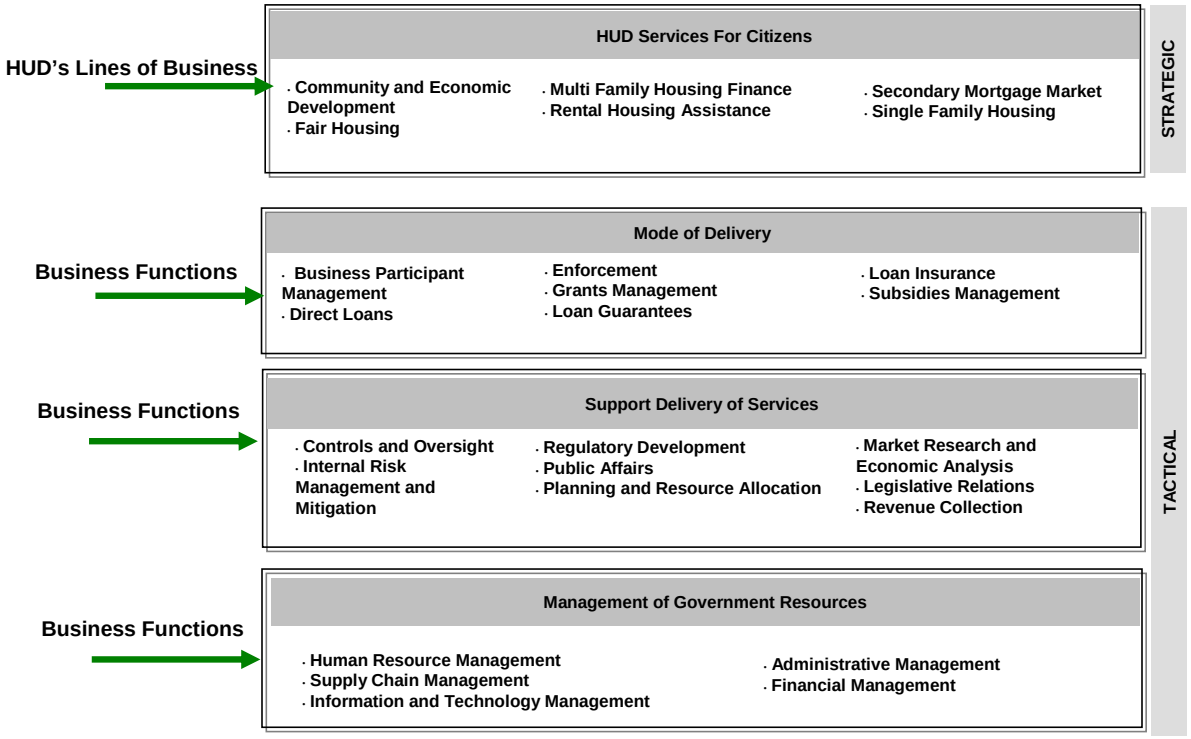
5.3 BUSINESS REFERENCE MODEL OVERVIEW

The HUD BRM provides a department-wide taxonomy for understanding HUD's business operations, organized hierarchically. At the highest level of the taxonomy, the HUD BRM consists of four primary business areas, shown in Exhibit 5-3, HUD Business Reference Model. The definition for each of the four business areas is as follows:

- **Services for Citizens** – the LOBs through which HUD delivers services both to and on behalf of the American citizen.
- **HUD's Mode of Delivery** – the mechanisms HUD's LOBs use to deliver goods and services.

- **HUD's Support Delivery of Services** – the critical policy, programmatic and managerial foundation to support HUD's operations.
- **HUD's Management of Government Resources** – the back office support activities that enable HUD to operate effectively.

Exhibit 5-3 – HUD's Business Reference Model



The Services for Citizens business area identifies HUD's six LOBs. HUD's LOBs represent a ***strategic view*** of HUD's business (i.e. why HUD exists). Each LOB provides a unique set of business services to customers and plays a unique role in fulfillment of HUD's mission. LOBs provide business services to customers either directly or through a partner. In order to provide business services, LOBs carry out a set of business functions.

The Mode of Delivery, Support Delivery of Services and Management of Government Resources business areas constitute a ***tactical view*** of HUD's business (i.e. how HUD delivers its goods and services). These three business areas comprise the complete set of HUD's business functions, which support the LOBs in the Services to Citizens business area.

A single LOB is typically supported by multiple business functions. For example, the Single Family Housing LOB comprises all functions within the Mode of Delivery business area. Likewise, a single function may be performed within or support multiple LOBs. For example, both Rental Housing Assistance and Community and Economic Development LOBs perform the Grants Management function. Moreover, functions within the Management of Government Resources and Support Delivery of Services business areas (e.g. HR Management, Financial Management, etc.) support all of HUD's LOBs.

The relationship between HUD's Mode of Delivery business functions and its LOBs is unique, as they are the functions that most directly enable the execution of LOB operations and ultimately, HUD's mission. Mode of Delivery business functions have varying levels of relevance and impact within each LOB. Exhibit 5-4 below shows which business functions enable the execution of each LOB. The level of relevance of each business function to each LOB is represented along a continuum of high, medium, or low. For example, while the Grants Management function is central to the Community and Economic Development LOB (High), it plays only an ancillary role in the Fair Housing LOB (LOB).

Exhibit 5-4 – Relationship of HUD's LOBs to the Mode of Delivery Functions

HUD Mode of Delivery Business Functions → / HUD's Services for Citizens LOBs	Loan Insurance	Loan Guarantees	Grants Management	Subsidies Management	Direct Loans	Business Participant Management	Enforcement
Community and Economic Development	Low	-	High	-	Low	Medium	Low
Fair Housing	-	-	Low	-	-	Medium	High
Multi Family Housing Finance	High	Low	Medium	Low	Low	Medium	Medium
Rental Housing Assistance	Low	-	High	Medium	Low	Medium	Medium
Secondary Mortgage Market	-	High	-	-	-	Low	Low
Single Family Housing	High	Low	Low	Low	Low	Medium	Medium

5.4 RELATIONSHIP TO THE FEDERAL ENTERPRISE ARCHITECTURE BRM

The HUD BRM framework is based upon and aligned with FEA BRM. Detailed documentation of this alignment is a critical requirement of the Federal budget process. In order to justify its IT investments, HUD is required to demonstrate how the investments support and align with the FEA BRM. This Target EA allows initiative owners to easily map to the FEA BRM by first mapping their initiatives to HUD's BRM, then following the relationships defined between the HUD BRM and the FEA BRM, detailed in Appendix D.

The basic relationship between the HUD BRM and the FEA BRM at a high level is as follows:

- **General** – There are two basic departures from the FEA BRM that HUD has made with its BRM worth noting:
  - **Business Functions** – HUD has introduced the term "Business Function" to represent the top level in its functional hierarchy,

whereas the FEA BRM does not use this construct. Instead, the FEA nests "sub-functions" as the top level decomposition within LOBs.

  - **Relationship Between Lines of Business and Business Functions** – HUD believes that business functions do not nest neatly within a single LOB, as represented within the FEA BRM. Rather, a single business function may support multiple LOBs.

- **Services to Citizens Business Area** – Unlike the FEA BRM, HUD's Services to Citizens Business Area exclusively comprises the Department's LOBs, and does not decompose to a lower level in the hierarchy. The LOBs represent service offerings that are unique to fulfilling HUD's mission, and do not map one-to-one to anything currently defined in the FEA. All of the LOBs in the HUD BRM map to one or more of four FEA sub-functions:

  - Housing Assistance
  - Community and Regional Development
  - Homeownership Promotion
  - Social Services

- **Mode of Delivery Business Area** – Several of the business functions in the HUD Mode of Delivery Business Area derive directly from sub-functions defined in the FEA BRM. However, others map to multiple FEA Mode of Delivery LOBs and sub-functions. The complete mapping is provided in Appendix D.

- **Support Delivery of Services Business Area** – The HUD BRM adopts the FEA LOBs and sub-functions with only minor modifications. The three modifications include: addition of the HUD function "Market Research and Economic Analysis"; non-inclusion of the FEA LOB "General Government," which is not applicable to HUD; and inclusion of only the "Federal Asset Sales" sub-function within the FEA's "Revenue Collection" LOB.

- **Management of Government Resources Business Area** – The HUD BRM adopts the FEA LOBs and sub-functions without modification.

5.5 HUD BUSINESS REFERENCE MODEL DETAILS

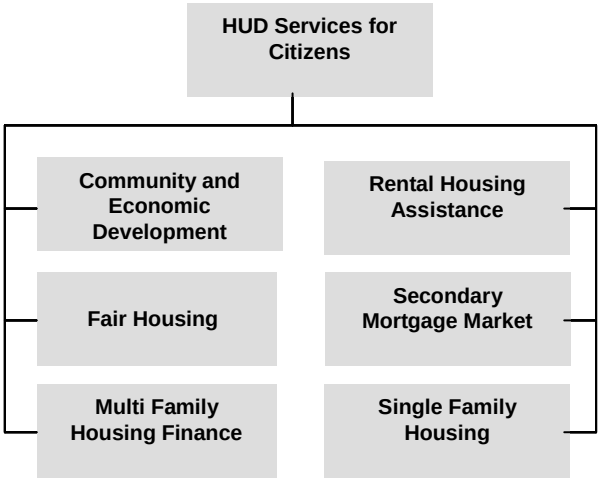
The HUD BRM is comprised of 4 business areas, 6 Lines of Business, 20 business functions and 97 sub-functions. Each of the business areas is further defined in the following sections to include the following information:

- Definition of the business area.
- Business Area Hierarchy.
- Definitions of the LOBs and business functions or sub-functions.
- Mapping of the business area to HUD offices.

5.5.1 Services for Citizens

The **HUD Services for Citizens** business area encompasses the LOBs through which HUD delivers services both to and on behalf of the American citizen.

Exhibit 5-5 – HUD Services for Citizens



5.5.1.1 HUD Services for Citizens Definitions

Community and Economic Development - The Community and Economic Development LOB supports efforts by states, local communities and other HUD partners for the construction and rehabilitation of homes, community structures and infrastructure, and other community revitalization and job

creation projects. This LOB also includes HUD's programs dedicated to helping communities prevent/end homelessness and transition victims of temporary and chronic homelessness into permanent housing. Programs encompassed within the Community and Economic Development LOB also address issues including affordable housing, housing for persons with HIV/AIDS, and establishing policies for environmentally sound and energy efficient housing.

Fair Housing - The Fair Housing (FH) LOB allows HUD to effectively promote, monitor, and enforce fair and equal housing opportunities, practices, and laws, respectively. In addition, this LOB equips HUD with the capabilities to develop policies and introduce legislation that ensure equal access to housing, and manage grants processes supporting fair housing programs. Also, within its purview is the monitoring of local housing agencies, as well as Government Sponsored Entities (GSEs) like Freddie Mac and Fannie Mae for compliance with fair housing laws and practices.

Multi Family Housing Finance - HUD's Multi Family Housing Finance (MFHF) LOB provide mortgage insurance to HUD-approved lenders to facilitate the construction, rehabilitation, purchase and refinancing of multifamily housing properties and healthcare facilities. It provides capabilities that promote the migration of renters of multi-family units to ownership through the administration of vouchers for down payments or mortgage payments, as well as certain capital grant programs dedicated to the building or maintenance of multi-family dwellings.

Rental Housing Assistance – The Rental Housing Assistance LOB provides decent and affordable rental housing to low-to-medium income families, primarily through the use of grants and subsidies (e.g., tenant and project based vouchers). It also allows HUD to insure loans used for the development, purchase, refinance, and rehabilitation of rental housing; provide financial vehicles such as direct loans to fund the construction, purchase, operation, and maintenance of rental housing for the elderly and disabled.

Secondary Mortgage Market - The Secondary Mortgage Market (SMM) LOB allows HUD to promote homeownership by managing programs responsible for channeling funds from investors into the mortgage industry, whereby establishing a secondary mortgage market that creates an abundant supply of mortgage funds for potential homeowners.

Single Family Housing - HUD's Single Family Housing LOB segment primarily provides mortgage insurance to lenders on loans for the development/purchase/refinancing of new or existing homes, condominiums, and manufactured housing; financing of houses needing rehabilitation; and for reverse equity mortgages to elderly homeowners. Secondary activities within this LOB include the administration of subsidies (i.e., vouchers) for use toward down payments or mortgage payments, as well as certain grant programs dedicated to the building or maintenance of single family dwellings.

5.5.1.2 HUD Services for Citizens Mapping by Organization

HUD's LOBs are defined independent of the offices that perform them. Exhibit 5-6 provides the relationship between HUD organizations and the LOBs within the Services for Citizens business area.

Exhibit 5-6 – HUD Services for Citizens Alignment by Organization

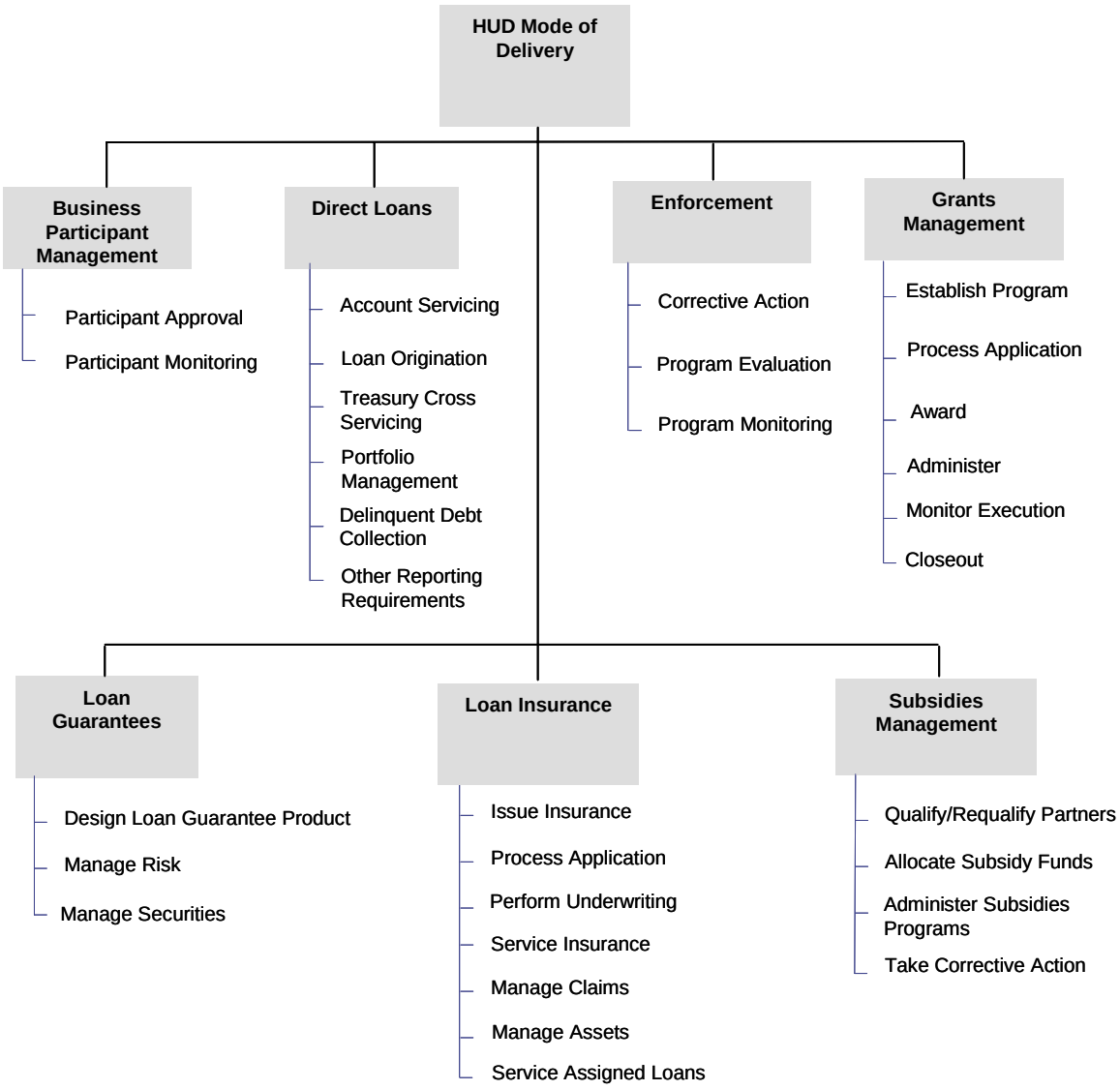
Organizations → HUD Services for Citizens LOBs	ADM	CFBCI	CFO	CIR	CPD	DEPSEC	ENEC	FHEO	FPM	GNMA	HSG	OCIO	ODEEO	OGC	OHHLHC	OIG	PA	PDR	PIH	REAC	SEC
Community and Economic Development	X	X	X		X*	X	X	X			X	X		X			X	X	X	X	X
Fair Housing	X		X		X	X	X	X*			X	X		X			X	X	X	X	X
Multi Family Housing Finance	X		X		X	X	X	X		X	X*	X		X	X		X	X	X*	X	X
Rental Housing Assistance	X	X	X		X	X		X			X*	X		X	X		X	X	X*	X	X
Secondary Mortgage Market	X		X			X		X		X*	X	X		X			X	X	X	X	X
Single Family Housing	X		X		X		X	X		X	X*	X		X	X		X	X		X	X

*Primary office that performs LOB

5.5.2 Mode of Delivery

The Mode of Delivery business area describes the mechanisms HUD's LOBs use to deliver goods and services.

Exhibit 5-7 – HUD Mode of Delivery



5.5.2.1 HUD Mode of Delivery Definitions

BUSINESS PARTICIPANT MANAGEMENT- Enables HUD to effectively manage its communications and coordination with the public and its program participants (e.g., business partners, non-profit organizations, community organizations, state and local governments, other Federal agencies etc.) regarding its programs, operations, goals, objectives, and performance.

- **Participant Approval** – Involves assessing various housing, fair housing, community development, and other HUD partner entities' qualifications and performance (e.g., lenders, appraisers, inspectors, real estate brokers, developers, closing agents, non-profits organizations, etc.), ensuring they meet certain standards and requirements in order to qualify as reliable and quality HUD advocated entities, through which HUD services can by requested and delivered by HUD program offices, citizens and other partners.

- **Participant Monitoring –** Includes monitoring of HUD approved business partners to ensure that they are in compliance with HUD standards and requirements and that they effectively deliver HUD programs.

DIRECT LOANS- Includes activities associated with HUD lending funds directly to non-governmental entities for affordable housing, homeownership, and community development activities.

- **Account Servicing –** Includes activities associated with general administration and maintenance of the direct loan from the time it is issued until the obligation is paid, such as payment collection and processing, escrow administration, changing contract information, and accounting procedures.

- **Loan Origination –** Includes activities that allow HUD to properly initiate the direct loan process, such as borrower qualification, application processing, underwriting, funds disbursement, and accounting of loan.

- **Treasury Cross Servicing –** Includes the activities that allow HUD to participate in the Treasury's Cross-Servicing Program, where the Department must transfer its non-tax 180 day delinquent debts (owed by the Public for direct and insured loans) to the Treasury for collection. Includes the following activities: Identify Accounts Selected, Monitor Accounts Referred to Debt Collection Center, Support Agencies Request to Cross Service

- **Portfolio Management –** Encompasses the activities that allow HUD to manage its direct loans collectively as a portfolio of assets rather than individual entities. This helps monitor loan performance to improve risk assessment and refine lending practices. Includes the following activities: Perform Portfolio Performance, and Sell Portfolios.

- **Delinquent Debt Collection –** Allows HUD to initiate collection or closeout procedures (for proper accounting) on past due debts owed to it by recipients of its services. Includes the following activities: Perform Collection Actions, Perform Write-offs and Close Outs, and Service Troubled Debt.

- **Other Reporting Requirements –** Encompasses the activities that enable HUD to report all required information associated with direct loans such as loan amount, payment/transaction history, recipient, etc. Includes the following activities: Analyze External Reporting Requirements, and Analyze Transaction History.

ENFORCEMENT- Involves monitoring HUD partners, the general housing industry, and individuals subject to housing laws or regulations, and resolving issues through conciliation, arbitration and enforcement.

- **Corrective Action -** Involves the enforcement of activities to remedy internal or external HUD programs or participants that have been found non-compliant with a given laws, HUD regulations, or policies.

- **Program Evaluation –** Involves the assessment and analysis of internal and external HUD program effectiveness, and the proposal of revisions to program policy or other corrective actions as appropriate.

- **Program Monitoring -** Involves the data-gathering activities required to determine the effectiveness of internal and external programs and the extent to which they comply with related laws and regulations, HUD policies.

GRANTS MANAGEMENT- Encompasses the activities (i.e., evaluating, scoring, awarding, monitoring grant programs) supporting the administration and management of grants programs (e.g., formula, discretionary) for communities, state, and local governments and other organizations in order to develop fair, safe, and affordable housing and to expand economic opportunity. The scope of HUD's grants management activities is limited to back-office grant processes, ensuring little duplication with the Grants.gov effort, which is a front-end portal that allows grantees access to grants information.

- **Establish Program –** Establishes and maintains guidelines and requirements for grants programs. Includes determining source of funds and allocation amounts, and identifying the potential grantee

pool. Can also include publishing grant information (e.g., application instructions) for the public in various channels.

- **Process Application –** Includes receiving grant applications, evaluating the grant application/request (e.g., pre-screen, conduct technical review, score, rank, review past performance, etc.), reviewing budget for funds allocation, making award selection, and notifying recipient.

- **Award -** Includes the assignment and sub assignment of funds, which encompasses the negotiation process and the paperwork to execute a proper grant agreement. Specifically includes the preparation and issuance of the award notification and transfer of funds to recipient.

- **Administer –** Encompasses activities associated with maintaining the grant after it has been awarded. Establishes payment thresholds and caps, facilitates receivables and funds disbursement, as well as allowing the grantees to report accomplishments. Each grantee may be required to provide information for their funds prior to drawdown.

- **Monitor Execution –** Includes the activities that ensure that grantee's performance is aligned with the grant agreement. This phase establishes performance baselines, tracks use of funds and deliverables through remote and on-site monitoring of grantees, assesses risk factors influencing meeting goals set forth in grant agreement, and rates performance against baseline standards/metrics.

- **Closeout –** Encompasses activities associated with the closeout of the individual grants within a grant program. Includes preparing and delivering closeout notification, performing closeout audit if needed, reviewing grantee performance documentation to ensure compliance with grant agreement, and processing final payment.

LOAN GUARANTEES – Encompasses the activities associated with providing liquidity to the secondary mortgage market by attracting capital from the Nation's capital markets into the residential mortgage markets.

- **Design Loan Guarantee Product –** Includes activities supporting the pooling of Federal Housing Administration (FHA), Department of Veterans Affairs (VA), Rural Housing Services (RHS), and Native American loan products into mortgage-backed securities.

- **Manage Risk –** Includes activities involved in managing risk for mortgage-backed securities; includes maintaining market share.

- **Manage Securities –** Encompasses activities involved in overseeing and administering mortgage-backed securities. Specifically includes Approving Issuers, Managing Portfolios (for Issuers and Ginnie Mae), and Monitoring and Reviewing Issuers.

LOAN INSURANCE - Involves the provision of loan insurance for the financing of property improvement, manufactured housing, and community development projects. This includes mortgage insurance for the purchase and/or rehabilitation of single family housing, rental housing, hospitals, and reverse equity mortgages.

- **Issue Insurance** – Encompasses activities involved in overseeing and administering housing insurance and direct loan programs. Specifically includes Lender Approval, Underwriting, Initial and Final Closings, and Endorsements.

- **Process Application** – Includes activities that initiate the process for issuing insurance in support of a loan, such as application intake, review of application documents and applicant information, and lender and borrower qualification.

- **Perform Underwriting –** Includes activities supporting the analysis of the risk associated with a loan before issuing insurance on the loan (i.e., the loan recipient's ability to repay, the property's value supports mortgage amount, loan amount, etc.).

- **Service Insurance –** Includes activities associated with general administration and maintenance of insurance supporting a loan from the time it is issued until the loan is paid.

- **Manage Claims –** Encompasses activities that enable HUD to process insurance claims for insured loans defaulted on by borrowers, such as funds disbursement back to lenders.

- **Manage Assets** – Encompasses activities supporting the management of HUD held assets. Specifically includes servicing notes; property management; property disposition; portfolio management; marketing and sale of assets, including notes.

- **Service Assigned Loans** – Encompasses administration and processing activities for mortgage insurance and loans. Activities include default monitoring and loss mitigation, processing of payments, and retiring loans or insurance.

SUBSIDIES MANAGEMENT - Encompasses the activities associated with the provision of vouchers and other types of subsidies to individuals and public housing bodies in support of rental assistance, housing modernization, and homeownership (i.e., tenant based and project-based vouchers, vouchers for rehabilitation, and vouchers for down payments and mortgages, respectively).

- **Qualify/Requalify Partners** – Encompasses activities supporting the assessment of existing and potential partner qualifications to qualify/requalify them as HUD-approved partners/recipients of HUD subsidies (e.g., project-based vouchers). Specific qualifications evaluated include management capabilities; and the capacity to carry out rental assistance program activities.

- **Allocate Subsidy Funds –** Enables HUD to properly determine recipients of funding based on analysis of demographic information (e.g., rent costs, income), select recipients, review funds availability, and disburse subsidy payments to recipients.

- **Administer Subsidies Program –** Includes activities associated with the management and maintenance of subsidies after they have been awarded, such as usage monitoring to ensure that funds are properly spent.

- **Take Corrective Action –** Includes activities related to exception processing and escalating issues to appropriate parties for corrective action based on level of security.

5.5.2.2 HUD Mode of Delivery by Organization

HUD's business functions are defined independent of the offices that perform them. Exhibit 5-8 provides the relationship between HUD organizations and the business functions within the Mode of Delivery business area.

Note that several organizations do not directly participate in HUD's Lines of Business through the execution of Mode of Delivery business functions. Rather, these organizations perform business functions that directly support

ALL HUD LOBs. These business functions are encompassed within the Support Delivery of Services and Management of Government Resources LOBs.

Exhibit 5-8 – HUD Mode of Delivery Alignment by Organization

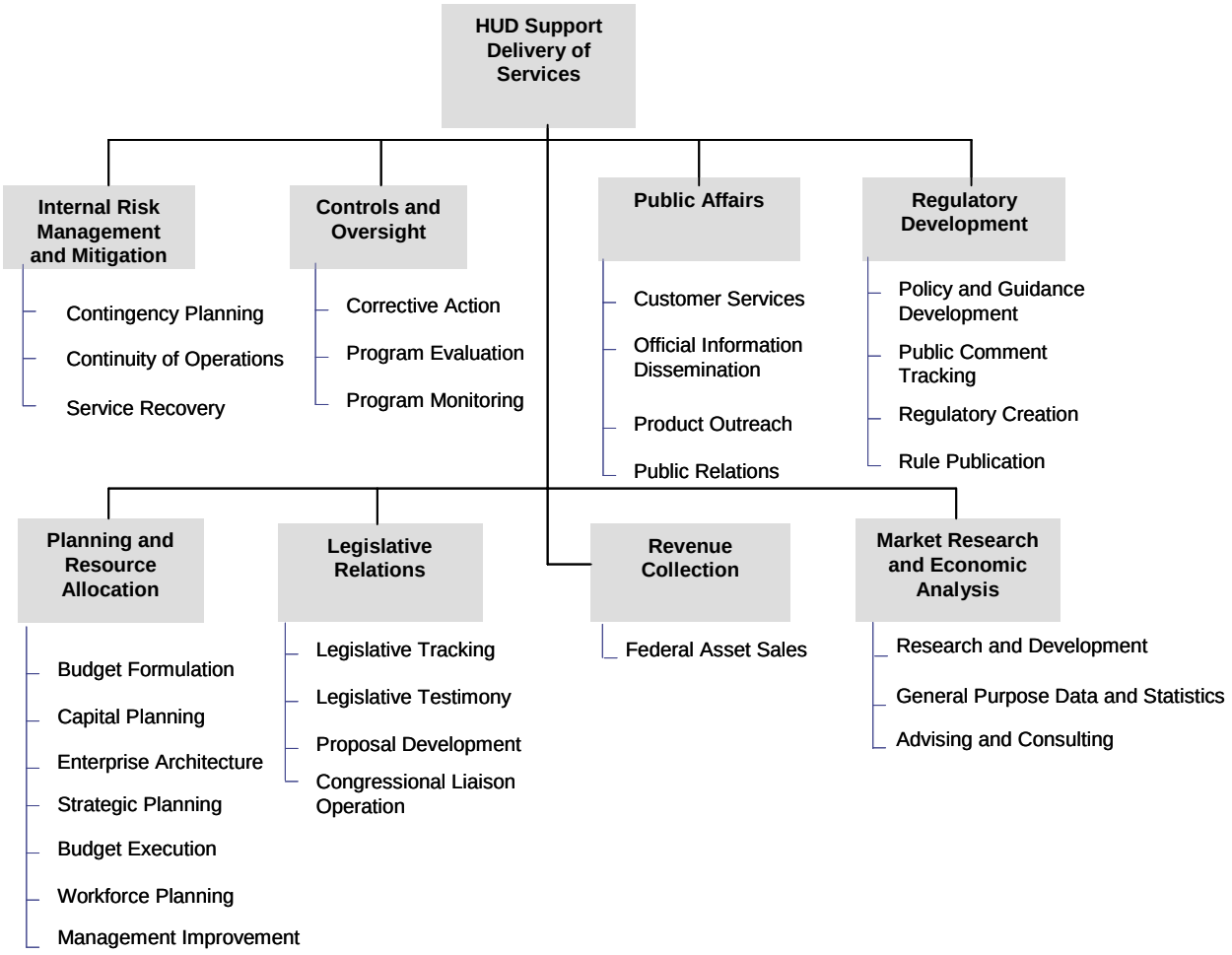
Organizations → / HUD Mode of Delivery Functions	ADM	CFBCI	CFO	CIR	CPD	DEPSEC	ENFC	FPM	FHEO	GNMA	HSG	OCIO	ODEEO	OHHLHC	OGC	OIG	PA	PDR	PIH	REAC	SEC
Business Participant Management	X	X	X	X	X	X	X		X	X	X			X	X		X	X	X	X	X
Participant Approval	X	X	X	X	X	X	X		X	X	X			X	X		X	X	X	X	X
Participant Monitoring	X	X	X	X	X	X	X		X	X	X			X	X		X	X	X	X	X
Direct Loans		X	X		X				X		X				X				X		
Account Servicing		X	X		X				X		X				X				X		
Loan Origination		X	X		X				X		X				X				X		
Treasury Cross Servicing		X	X		X				X		X				X				X		
Portfolio Management		X	X		X				X		X				X				X		
Delinquent Debt Collection		X	X		X				X		X				X				X		
Other Reporting Requirements		X	X		X				X		X				X				X		
Enforcement	X	X	X	X	X		X		X		X			X	X			X	X	X	X
Corrective Action	X	X	X	X	X		X		X		X			X	X				X	X	X
Program Evaluation	X	X	X	X	X		X		X		X			X	X			X	X	X	X
Program Monitoring	X	X	X	X	X		X		X		X			X	X			X	X	X	X
Grants Management	X	X	X		X			X	X		X			X	X			X	X		
Establish Program	X	X	X		X			X	X		X			X	X			X	X		
Process Application	X	X	X		X			X	X		X			X	X			X	X		
Award	X	X	X		X			X	X		X			X	X			X	X		
Administer	X	X	X		X			X	X		X			X	X			X	X		
Monitor Execution	X	X	X		X			X	X		X			X	X			X	X		

Organizations → / HUD Mode of Delivery Functions	ADM	CFBCI	CFO	CIR	CPD	DEPSEC	ENEC	FPM	FHEO	GNMA	HSG	OCIO	ODEEO	OHHLHC	OGC	OIG	PA	PDR	PIH	REAC	SEC
Closeout	X	X	X		X			X	X		X			X	X			X	X		
Loan Guarantees			X		X				X	X	X				X						
Design Loan Guarantee Product			X		X				X	X	X				X						
Manage Risk			X		X				X	X	X				X						
Manage Securities			X		X				X	X	X				X						
Loan Insurance			X		X				X		X				X				X		
Issue Insurance			X		X				X		X				X				X		
Process Application			X		X				X		X				X				X		
Perform Underwriting			X		X				X		X				X				X		
Service Insurance			X		X				X		X				X				X		
Manage Claims			X		X				X		X				X				X		
Manage Assets			X		X				X		X				X				X		
Service Assigned Loans			X		X				X		X				X				X		
Subsidies Management					X						X				X				X	X	
Qualify/Requalify Partners					X						X				X				X	X	
Allocate Subsidy Funds					X						X				X				X	X	
Administer Subsidies Program					X						X				X				X	X	
Take Corrective Action					X						X				X				X	X	

5.5.3 Support Delivery of Services

The **HUD Support Delivery of Services** business area provides the critical policy, programmatic and managerial foundation to support HUD's operations.

Exhibit 5-9 – Support Delivery of Services



5.5.3.1 HUD Support Delivery of Services Definitions

INTERNAL RISK MANAGEMENT AND MITIGATION - Permits HUD to analyze its exposure to risk and develop appropriate mitigation and countermeasure strategies.

- **Contingency Planning** - Contingency Planning involves the actions required to plan for, respond to, and mitigate damaging events.
- **Continuity Of Operations** - Continuity of Operations involves the activities associated with the identification of critical systems and

processes, and the planning and preparation required to ensure that these systems and processes will be available in the event of a catastrophic event.

- **Service Recovery** - Service Recovery involves the internal actions necessary to develop a plan for resuming operations after a catastrophic event occurs.

CONTROLS AND OVERSIGHT - Allows HUD to maintain close oversight for the programs and funds for which it is responsible. It allows HUD to improve the performance management of the business partners that constitute its highly distributed service delivery model and execute most of its programs, ensuring that HUD programs are providing their intended results for citizens and communities.

- **Corrective Action** - Corrective Action involves the enforcement of activities to remedy internal or external programs or participants that have been found non-compliant with a given law, regulation, or policy.

- **Program Evaluation** – Program Evaluation involves the analysis of internal and external program effectiveness and proposed revisions to achieve policy objectives or corrective actions as appropriate.

- **Program Monitoring** - Program Monitoring involves the data-gathering activities required to determine the effectiveness of internal and external programs and the extent to which they comply with related laws, regulations, and policies.

PUBLIC AFFAIRS - Enables HUD to effectively communicate with and exchange information between its stakeholders, business partners, citizens, and other government entities in direct support of its programs, services, and policies. To optimally disseminate official HUD information, market its services, promote its brand, and garner customer feedback, the Department leverages all available media outlets, including video, print, and Internet, giving it a wide reach to an audience with otherwise limited information access.

- **Customer Services** - Customer Services supports activities associated with providing an agency's customers with information regarding the agency's service offerings and managing the interactions and relationships with those customers.

- **Official Information Dissemination** – Official Information Dissemination includes all efforts to provide official government information to external stakeholders through the use of various types of media, such as video, paper, web, etc.

- **Product Outreach** - Product Outreach relates to the marketing of government services products, and programs to the general public in an attempt to promote awareness and increase the number of customers/beneficiaries of those services and programs.

- **Public Relations** - Public Relations involves the efforts to promote an organization's image through the effective handling of citizen concerns.

REGULATORY DEVELOPMENT – Allows HUD to perform activities associated with developing regulations, policies, and guidance to implement laws.

- **Regulatory Creation** - Regulatory Creation involves the activities of researching and drafting proposed and final regulations.

- **Rule Publication** - Rule Publication includes all activities associated with the publication of a proposed or final rule in the Federal Register and Code of Federal Regulations.

- **Public Comment Tracking** - Public Comment Tracking involves the activities of soliciting, maintaining, and responding to public comments regarding proposed regulations.

- **Policy and Guidance Development** – Policy and Guidance Development involves the creation and dissemination of guidelines to assist in the interpretation and implementation of regulations.

PLANNING AND RESOURCE ALLOCATION – Enables HUD to determine its strategic direction, identify and establish its programs and processes, and allocate resources (capital and labor) among these programs and processes.

- **Budget Formulation** - Budget Formulation involves all activities undertaken to determine priorities for future spending and to develop an itemized forecast of future funding and expenditures during a targeted period of time. This includes the collection and use of

performance information to assess the effectiveness of programs and develop budget priorities.

- **Capital Planning** - Capital Planning involves the processes for ensuring that appropriate investments are selected for capital expenditures.

- **Enterprise Architecture** - Enterprise Architecture is an established process for describing the current state and defining the target state and transition strategy for an organization's people, processes, and technology.

- **Strategic Planning** - Strategic Planning entails the determination of annual and long-term goals and the identification of the best approach for achieving those goals.

- **Budget Execution** – Budget Execution involves day-to-day requisitions and obligations for agency expenditures, invoices, billing dispute resolution, reconciliation, service level agreements, and distributions of shared expenses.

- **Workforce Planning**- Workforce Planning involves the processes for identifying the workforce competencies required to meet the agency's strategic goals and for developing the strategies to meet these requirements.

- **Management Improvement** - Management Improvement includes all efforts to gauge the ongoing efficiency of business processes and identify opportunities for reengineering or restructuring.

LEGISLATIVE RELATIONS - Enables HUD to perform activities aimed at the development, tracking, and amendment of public laws by effectively communicating and managing its relationship with Congress. It allows HUD to accurately present its views to Congress, including defending its budget requests and legislative initiatives.

- **Legislation Tracking** – Legislation Tracking involves monitoring legislation from introduction to enactment and implementation.

- **Legislation Testimony** - Legislation Testimony involves activities associated with providing testimony/evidence in support of, or opposition to, legislation.

- **Proposal Development** – Proposal Development involves drafting proposed legislation that creates or amends laws subject to Congressional action.

- **Congressional Liaison Operations**- Congressional Liaison Operations involves all activities associated with supporting the formal relationship between a Federal Agency and the U.S. Congress.

REVENUE COLLECTION – Allows HUD to collect income from the sale of its external assets with commercial value to non-government, private sector entities. Specifically, it equips HUD with capabilities to acquire, monitor, track, and sell its housing properties (e.g., land, multi-family buildings, and single family homes) to non-government entities.

- **Federal Asset Sales** - Federal Asset Sales encompasses the activities associated with the acquisition, oversight, tracking, and sale of non-internal assets managed by the Federal Government with a commercial value and sold to the private sector.

MARKET RESEARCH AND ECONOMIC ANALYSIS - Allows HUD to perform the research and analysis of housing markets, industry trends, community needs, demographics, legislation, policies, programs, and the economy. This information is analyzed to support the development of policies and programs that adequately address the changing needs of HUD's customers, amid changing socioeconomic conditions. HUD also performs market research and economic analysis in response to special statistical requests from Congress, OMB, or the HUD Secretary. Finally, research and analytical findings are disseminated widely to other researchers, grantees, and other stakeholders.

- **Research and Development** – Research and Development involves the gathering and analysis of data, dissemination of results, and development of new products, methodologies, programs, and ideas.

- **General Purpose Data and Statistics** – General Purpose Data and Statistics includes activities performed in providing empirical, numerical, and related data and information pertaining to the current state of the nation in areas such as the economy, labor, weather, international trade, etc.

- **Advising and Consulting** – Advising and Consulting involves the guidance and consultative services provided by the Federal

Government to support the implementation of a specific Service for Citizen.

5.5.3.2 HUD Support Delivery of Services by Organization

HUD's business functions are defined independent of the offices that perform them. Exhibit 5-10 provides the relationship between HUD organizations and the business functions within the Support Delivery of Services business area.

Exhibit 5-10 – HUD Support Delivery of Services Alignment to HUD BRM by Organization

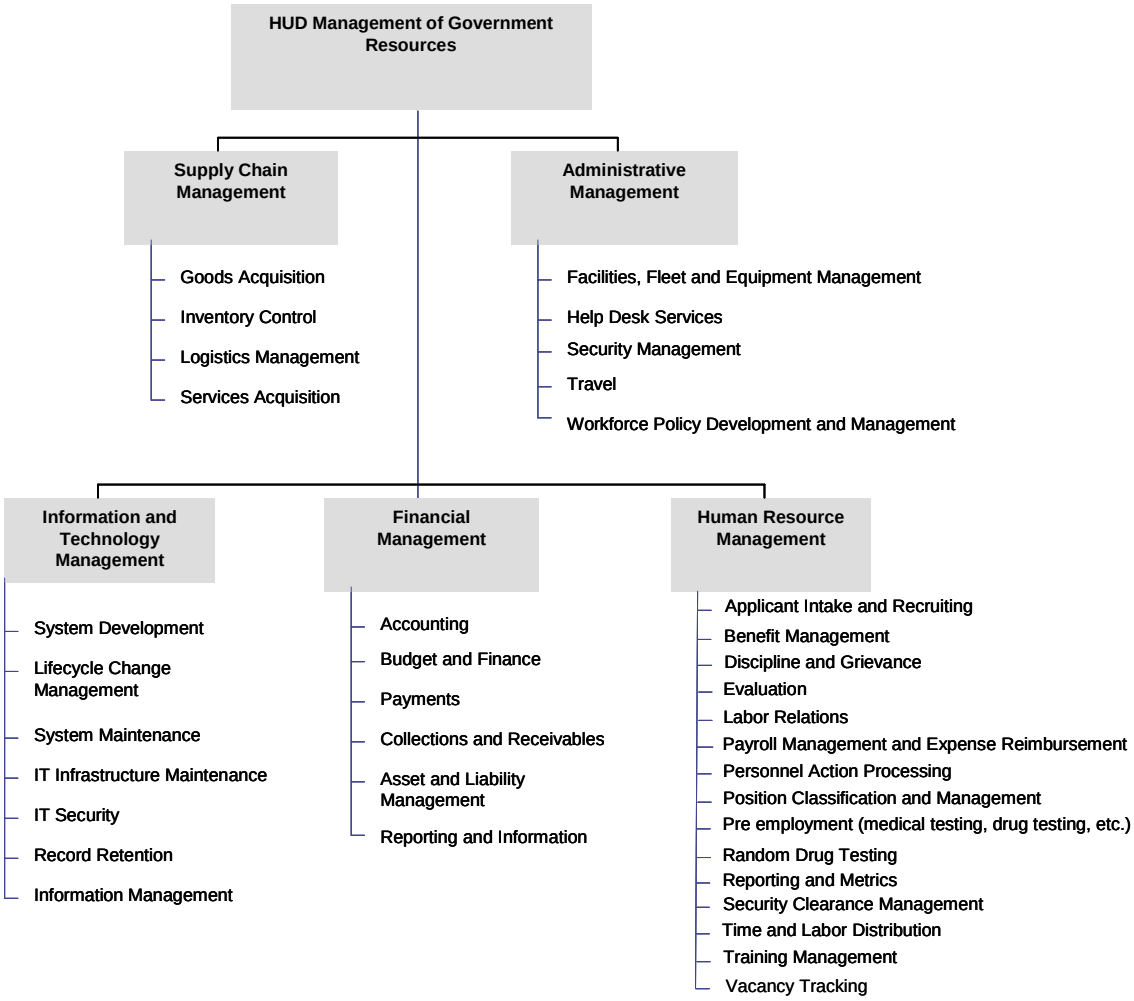
Organizations → / Support Delivery Of Services Functions and Sub-Functions	ADM	CFBCI	CEO	CIR	CPD	DEPSEC	ENEC	EHEO	EPM	GNMA	HSG	OCIO	ODEEO	OGC	OHHLHC	OIG	PA	PDR	PIH	REAC	SEC
Internal Risk Management and Mitigation	X	X	X		X	X	X	X	X		X	X	X	X	X	X		X	X	X	X
Contingency Planning	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Continuity of Operations	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Service Recovery	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Controls and Oversight	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X
Corrective Action	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X
Program Evaluation	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X
Program Monitoring	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X
Public Affairs	X	X	X		X	X	X	X		X	X	X		X	X		X	X	X	X	X
Customer Services	X	X	X		X	X	X	X		X	X	X		X	X		X		X	X	X
Official Information Dissemination	X	X	X		X	X	X	X		X	X	X		X	X		X	X	X	X	X
Product Outreach	X	X	X		X	X	X	X		X	X	X		X	X		X	X	X	X	X
Public Relations	X	X	X		X	X	X	X		X	X	X		X	X		X		X	X	X
Regulatory Development	X	X			X		X	X			X			X	X	X	X	X	X		X
Policy and Guidance Development	X	X			X		X	X			X			X	X	X		X	X		X

Organizations → / Support Delivery Of Services Functions and Sub-Functions	ADM	CFBCI	CFO	CIR	CPD	DEPSEC	ENEC	EHEO	EPM	GNMA	HSG	OCIO	ODEEO	OGC	OHHHC	OIG	PA	PDR	PIH	REAC	SEC
Public Comment Tracking	X	X			X		X	X			X			X	X		X		X		X
Regulatory Creation	X	X			X		X	X			X			X	X			X	X		X
Rule Publication	X	X			X		X	X			X			X	X				X		X
Planning and Resource Allocation	X	X	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X
Budget Formulation	X	X	X		X	X	X	X		X	X	X			X	X			X	X	X
Capital Planning	X	X	X		X	X	X	X		X	X	X			X	X			X	X	X
Enterprise Architecture	X	X			X	X	X	X		X	X	X			X	X			X	X	X
Strategic Planning	X	X			X	X	X	X		X	X	X			X	X		X	X	X	X
Budget Execution	X	X	X		X	X	X	X		X	X	X			X	X			X	X	X
Workforce Planning	X	X				X	X			X	X	X			X				X	X	X
Management Improvement	X	X	X		X	X	X	X		X	X	X			X	X			X	X	X
Legislative Relations	X	X	X	X	X			X			X			X					X		X
Legislation Tracking	X	X	X	X	X			X			X			X					X		X
Legislation Testimony	X	X	X	X	X			X			X			X					X		X
Proposal Development	X	X	X	X	X			X			X			X					X		X
Congressional Liaison Operations	X		X	X										X							
Revenue Collection			X								X								X		
Federal Asset Sales			X								X								X		
Market Research and Economic Analysis*	X		X		X	X	X	X		X	X	X			X			X	X	X	X
Research and Development	X		X		X	X	X	X		X	X	X			X			X	X	X	X
General Purpose Data and Statistics																		X			
Advising and Consulting					X	X		X		X	X				X				X	X	X

5.5.4 Management of Government Resources

The **HUD Management of Government Resources** business area refers to the back office support activities that enable the government to operate effectively.

Exhibit 5-11 – HUD Management of Government Resources



SUPPLY CHAIN MANAGEMENT - Allows HUD to effectively manage the lifecycle (purchase, track, maintain, replace/retire, etc.) of the physical goods and contracted services it acquires in support of delivering its services and executing its programs. This includes the capability of HUD to manage the private sector contractors that perform much of its outsourced work.

- **Goods Acquisition** - Goods Acquisition involves the procurement of physical goods, products, and capital assets to be used by the Federal government.

- **Inventory Control** - Inventory Control refers to the tracking of information related to procured assets and resources with regard to quantity, quality, and location.

- **Logistics Management** - Logistics Management involves the planning and tracking of personnel and their resources in relation to their availability and location.

- **Services Acquisition** - Services Acquisition involves the oversight and/or management of contractors and service providers from the private sector.

ADMINISTRATIVE MANAGEMENT – Enables HUD to perform many of the back-office type activities that support the execution of its primary, mission critical business operations.

- **Facilities, Fleet, And Equipment Management** – Facilities, Fleet, and Equipment Management involves the maintenance, administration, and operation of office buildings, fleets, machinery, and other capital assets that are possessions of the Federal Government.

- **Help Desk Services** - Help Desk Services involves the management of a service center to respond to government and contract employees' technical and administrative questions.

- **Security Management** - Security Management involves the physical protection of an organization’s personnel, assets, and facilities.

- **Travel** - Travel involves the activities associated with planning, preparing, and monitoring of business related travel for an organization’s employees.

- **Workplace Policy Development And Management** - Workplace Policy Development and Management includes all activities required to develop and disseminate workplace policies such as dress codes, time reporting requirements, telecommuting, etc.

INFORMATION AND TECHNOLOGY MANAGEMENT – Enables HUD to properly orchestrate the information technology resources (i.e., hardware and infrastructure) and systems it requires to effectively provide its services and execute its mission.

- **Lifecycle/Change Management** – Lifecycle/Change Management involves the processes that facilitate a smooth evolution, composition, and workforce transition of the design and implementation of changes to agency resources such as assets, methodologies, systems, or procedures.

- **System Development** – System Development supports all activities associated with the in-house design and development of software applications.

- **System Maintenance** – System Maintenance supports all activities associated with the maintenance of in-house designed software applications.

- **IT Infrastructure Maintenance** - IT Infrastructure Maintenance involves the planning, design, and maintenance of an IT Infrastructure to effectively support automated needs (i.e. platforms, networks, servers, printers, etc.).

- **IT Security**- IT Security involves all functions pertaining to the securing of Federal data and systems through the creation and definition of security policies, procedures and controls covering such services as identification, authentication, and non-repudiation.

- **Record Retention** - Records Retention involves the operations surrounding the management of the official documents and records for an agency.

- **Information Management** - Information Management involves the coordination of information collection, storage, and dissemination, and destruction as well as managing the policies, guidelines, and standards regarding information management.

FINANCIAL MANAGEMENT – Enables HUD to manage its financial control activities and the flow of financial information across its information systems.

- **Accounting**- Accounting entails accounting for assets, liabilities, fund balances, revenues and expenses associated with the maintenance of Federal funds and expenditure of Federal appropriations (Salaries and Expenses, Operation and Maintenance, Procurement, Working Capital, Trust Funds, etc.), in accordance with applicable Federal standards (FASAB, Treasury, OMB, GAO, etc.).

- **Budget and Finance** - Budget and Finance includes the management of the Federal budget process including the development of plans and programs, budgets, and performance outputs and outcomes as well as financing Federal programs and operations through appropriation and apportionment of direct and reimbursable spending authority, fund transfers, investments and other financing mechanisms.

- **Payments** - Payments include disbursements of Federal funds, via a variety of mechanisms, to Federal and private individuals, Federal agencies, state, local and international Governments, and the private sector, to effect payment for goods and services, or distribute entitlements, benefits, grants, subsidies, loans, or claims.

- **Collections and Receivables** - Collections and Receivables includes deposits, fund transfers, and receipts for sales or service.

- **Asset and Liability Management** - Assets and Liability Management provide accounting support for the management of assets and liabilities of the Federal government.

- **Reporting and Information**- Reporting and Information includes providing financial information, reporting and analysis of financial transactions.

HUMAN RESOURCE MANAGEMENT – Allows the management of human resources across HUD. It makes available all HR information to managers and supervisors for workforce planning and employee development, and helps to ensure that HUD employees are used in the most effective manner possible.

- **Applicant Intake and Recruiting –** Applicant Intake and Recruiting includes receiving, processing, rating, and ranking applicants for federal jobs and involving preparation of lists of eligible candidates for consideration by management.

- **Benefit Administration –** Benefit Administration includes providing guidance and consultation to agencies, employees, former employees, annuitants, survivors, and eligible family members regarding retirement, insurance, health benefits, injury compensation, and death and survivor benefits.

- **Discipline and Grievance –** Discipline and Grievance includes providing advice and assistance to employees and managers, program administration, research, and case management in matters related to conduct, performance, attendance, and dispute resolution.

- **Evaluation –** Evaluation includes assisting managers and supervisors in establishing, maintaining, and monitoring effective performance management programs to plan, monitor, develop, rate, and reward employee performance, and services that support formal and informal award programs to provide employee incentives and recognition.

- **Labor Relations –** Labor Relations involves establishing and maintaining effective relationships with labor organizations that represent federal employees, negotiating and administering labor agreements, and providing guidance and consultation to management on a variety of labor relations matters.

- **Payroll Management and Expense Reimbursement –** Payroll Management and Expense Reimbursement involves the administration and determination of federal employee compensation. Note: See Payments sub-function within Financial Management line of business for the actual payment of salary and expenses.

- **Personnel Action Processing –** Personnel Action Processing involves processing Requests for Personnel Actions, changes to employees' official personnel records or history, or involving establishing, maintaining, and monitoring the agency's official personnel system of record.

- **Position Classification and Management –** Position Classification and Management involves position evaluation, establishing and maintaining a position classification program to determine appropriate pay systems, occupational grouping, title and grade of positions, and advising on position and organizational design.

- **Pre employment (medical testing, drug testing, etc.) –** Pre employment includes determinations of applicants' fitness for duty (medical, drug testing, background investigations) before they are brought on board the agency's payroll.

- **Random Drug Testing –** Random Drug Testing entails managing and monitoring work associated with obtaining periodic drug tests for employees or contractors selected randomly from among the agency's workforce population.

- **Reporting and Metrics –** Reporting and Metrics entails providing information (both current and historical) for management decision making, tracking workload, and overall health of an organization.

- **Security Clearance Management –** Security Clearance Management refers to the processes associated with ensuring employees, contractors, and others have been approved to enter federal buildings, utilize federal services, and access sensitive information. This includes eligibility determination, badge issuance, clearance tracking, and security verification services.

- **Time and Labor Distribution –** Time and Labor Distribution includes establishing, maintaining, and monitoring time and attendance systems.

- **Training Management –** Training Management refers to planning, administering, or evaluating programs designed to develop employees and manage learning in the organization.

- **Vacancy Tracking –** Vacancy Tracking includes creating, issuing, and managing vacancy announcements.

HUD's business functions are defined independent of the offices that perform them. Exhibit 5-12 provides the relationship between HUD organizations and the business functions within the Management of Government Resources business area.

Exhibit 5-12 – HUD Management of Government Resources Alignment to HUD BRM by Organization

Organizations → / Management of Government Resources Functions and Sub-Functions	ADM	CFBCI	CFO	CIR	CPD	DEPSEC	ENFC	FHEO	FPM	GNMA	HSG	OCIO	ODEEO	OGC	OHHLHC	OIG	PA	PDR	PIH	REAC	SEC
Supply Chain Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Goods Acquisition	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Inventory Control	X																				
Logistics Management	X																				
Services Acquisition	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Administrative Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Facilities, Fleet, and Equipment Management	X																				
Help Desk Services	X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	
Security Management	X	X		X	X		X	X	X	X	X	X	X		X		X	X	X	X	
Travel	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Workplace Policy Development and Management	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	
Information and Technology Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Systems Development	X											X									
Lifecycle / Change Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
System Maintenance	X											X									
IT Infrastructure Maintenance	X											X									
IT Security	X											X									
Record Retention	X											X									
Information Management	X		X		X			X		X	X	X		X		X	X	X	X		
Financial Management	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Accounting		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Budget and Finance		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Payments		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Collections and		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X

Organizations → / Management of Government Resources Functions and Sub-Functions	ADM	CFBCI	CFO	CIR	CPD	DEPSEC	ENFC	FHEO	FPM	GNMA	HSG	OCIO	ODEEO	OGC	OHHLHC	OIG	PA	PDR	PIH	REAC	SEC
Receivables																					
Asset and Liability Management		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Reporting and Information	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Human Resource Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Applicant Intake and Recruiting	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Benefit Management	X																				
Discipline and Grievance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Evaluation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Labor Relations	X																				
Payroll Management and Expense Reimbursement	X																				
Personnel Action Processing	X																				
Position Classification and Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pre employment (medical, testing, drug testing, etc.)	X																				
Random Drug Testing	X																				
Reporting and Metrics	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Security Clearance Management	X																				
Time and Labor Distribution	X																				
Training Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vacancy Tracking	X																				

5.6 BUSINESS OPPORTUNITIES ANALYSIS

The HUD target business layer identifies a functionally-driven business model that provides a view of HUD not bound by organizational or

programmatic stovepipes. At the Departmental level, based on the mappings of organizations to LOBs and business functions (Exhibits 5-6, 5-8, 5-10, and 5-12), it appears that there is considerable overlap in the business activities performed by HUD's organizations. While this analysis is not at sufficient level of detail to definitively identify specific opportunities to eliminate duplication, it points to areas where further study is likely to yield opportunities.

The EA Transition Plan uses this analysis as a point of departure for prioritizing and sequencing segment architecture efforts focused on individual LOBs and business functions. Much of the detailed analysis of the business layer will take place through these segment architecture efforts, as the business is further decomposed at the process and activity level. Through the segment architecture efforts, integrated program teams (IPTs) of business and IT domain experts will come together to determine if opportunities exist for:

- Business Process Reengineering (BPR).
- Consolidation or centralization of common functions or processes.
- Competitive sourcing.
- Collaboration, coordination, and sharing.

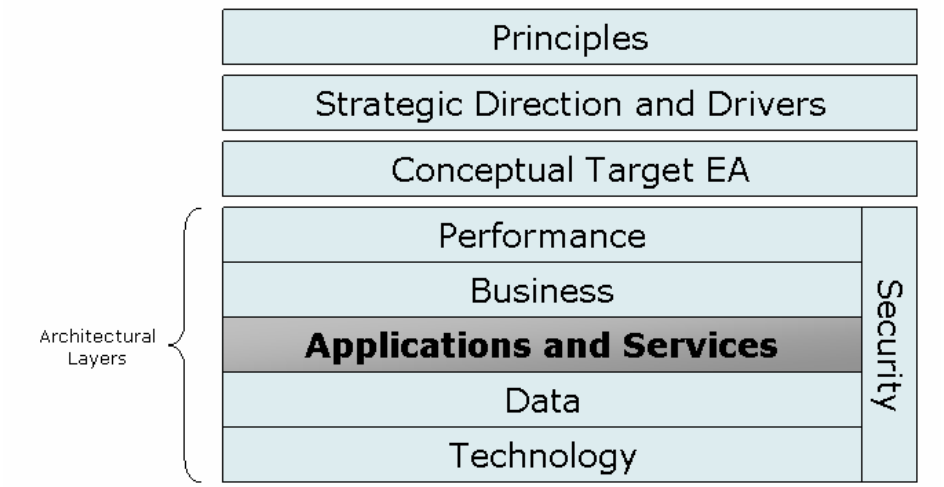
Appendix E, HUD BRM to Current Applications, and Appendix F, HUD BRM to Current Initiatives, identifies the HUD applications and initiatives, respectively, used in support of each LOB and business function. Based on these mappings, it appears that there is considerable overlap in the number and type of applications and initiatives supporting a given LOB or function across the Department. While no definitive conclusions can be drawn from these mappings, they point to areas where further study is likely to yield opportunities. Again, this further analysis will take place through segment architecture efforts.

6 APPLICATIONS AND SERVICES LAYER

6.1 INTRODUCTION

HUD's Target Applications and Services Layer describes the capabilities and functionality of HUD's IT applications. A Service Component Reference Model (SRM) is used to describe application capabilities and functionality. HUD's SRM consists of a 3-tiered hierarchy, consisting of service domains, types, and components, that describes the information processing capabilities needed to support HUD's business (i.e. the ability to capture, store, access, and manipulate business data and information). Exhibit 6-1 shows how the Applications and Services layer fits into the overall HUD Target EA Framework.

Exhibit 6-1 –Target EA Framework: Applications and Services



As described in Section 4 (Conceptual Target EA Vision), HUD has adopted a service-oriented, component-based approach to architecture, whereby it will "build once, use often." This architectural approach separates the functionality or capabilities of applications into the different services that they perform to promote the sharing and reuse of those capabilities across the enterprise.

This service-oriented approach stands in contrast to the current environment, in which each system or application contains a comprehensive set of unshared components needed to address a particular business purpose. For this reason, the Target Applications and Services Layer looks

different from the Baseline Applications and Services Layer. Rather than define the environment based on applications that are stovepiped around offices and/or business functions, the Target Applications and Services Layer consists of a set of components that provide both vertical services specific to certain types of business applications (e.g., Human Resources) and cross-cutting horizontal services that can be used by all types of applications (e.g. Search).

A service-oriented approach does not mean that the capabilities provided by HUD's existing applications and systems will be diminished. In fact, the target environment encompasses all of the capabilities provided by HUD's current applications, as well as new capabilities not currently provided. However, as HUD implements the Target EA, new ways of provisioning and sharing these capabilities will be explored. To help readers understand how current HUD applications and systems relate to the Target Applications and Services Layer, Appendix H provides a mapping of the current applications to the target SRM service components. Each of HUD's current applications can be viewed as a set of components designed and integrated to fulfill a specific set of business requirements.

To define HUD's Target Applications and Services Layer, HUD derived a set of target components by analyzing the Strategic Direction and Architectural Drivers (See Section 3), the Common Requirements Vision (See Section 4), and the business needs of HUD's LOBs (See Section 5). This set of components was then validated and expanded based on review against the current applications.

6.2 HUD SERVICE COMPONENT REFERENCE MODEL HIERARCHY

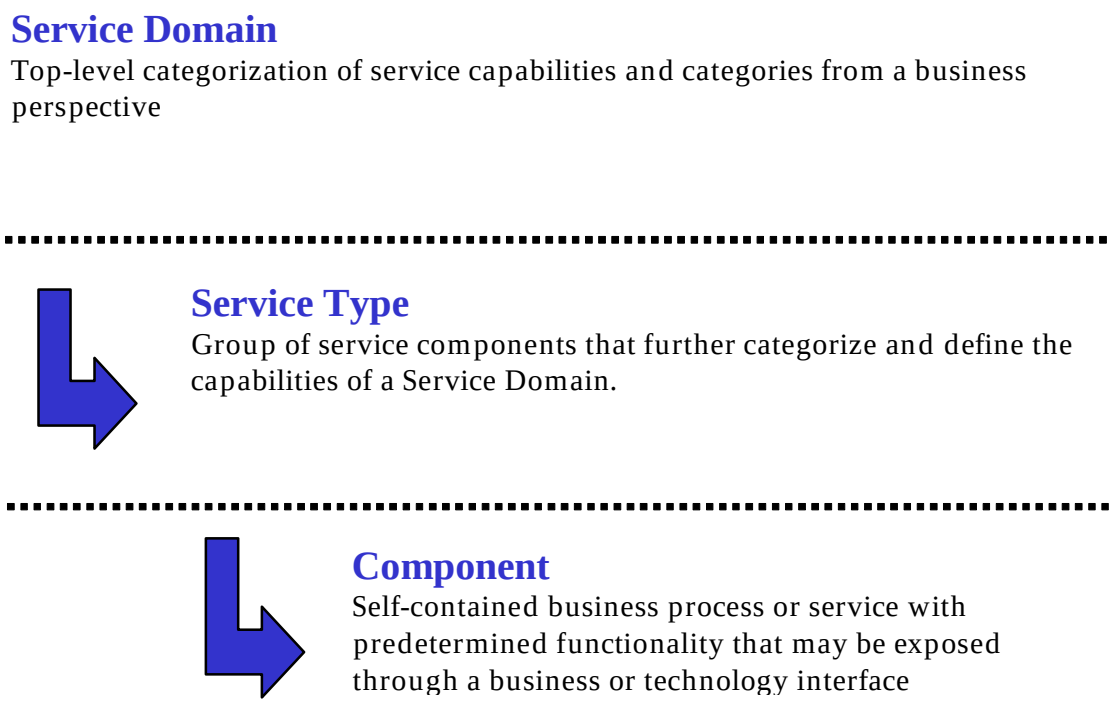
The framework for HUD's Target Applications and Services Layer is the Service Component Reference Model (SRM). The HUD **SRM** is a taxonomy and framework for identifying, organizing, and classifying components based on the type of functionality they provide. The HUD SRM is based on the FEA

SRM[9]. It follows the FEA taxonomy and encompasses that subset of the FEA SRM components required to support HUD's business. It is expected to grow and evolve, potentially expanding to include components not envisioned by the FEA SRM.

To promote sharing and reuse, it is important that a common set of definitions are applied when describing the Applications and Services Layer. Exhibit 6-2 depicts the hierarchical structure of the HUD SRM, and provides definitions of the three layers in the taxonomy: Service Domain, Service Type, and Component. Hierarchically, Service Domains contain multiple Service Types and, in turn, Service Types contain multiple Components.

9 *The Service Component Reference Model (SRM) Version 2.0, Federal Enterprise Architecture Program Management Office, June 2003.*

Exhibit 6-2 –HUD Service Component Reference Model Hierarchy



The SRM is designed to support the transformation of HUD to allow for:

- Increased Department-wide collaboration.
- Greater re-use of IT services and components.
- Reduction and Identification of duplicative investments.
- Increased horizontal and vertical information sharing.
- Identification of opportunities to leverage E-Gov initiatives and efforts.

6.3 HUD SERVICE COMPONENT REFERENCE MODEL OVERVIEW

At the highest level of the taxonomy, the HUD SRM consists of seven service domains, shown in Exhibit 6-3, HUD Service Component Reference Model. The definition for each of the seven service domains is as follows:

- **Customer Services** – refers to the set of capabilities that are directly related to the end customer, the interaction between the business and

the customer, and the customer-driven activities or functions. This Service Domain consists of 3 Service Types and 12 Components.

- **Process Automation Services** – refers to the set of capabilities that support the automation of process and management activities that assist in effectively managing the business. This Service Domain consists of 2 Service Types and 5 Components.

- **Business Management Services** – refers to the set of capabilities that support the management and execution of business functions and organizational activities that maintain continuity across the business and value-chain participants. This Service Domain consists of 4 Service Types and 18 Components.

- **Digital Asset Services** – refers to the set of capabilities that support the generation, management and distribution of intellectual capital and electronic media across the business and extended enterprise. This Service Domain consists of 4 Service Types and 24 Components.

- **Business Analytical Services** – refers to the set of capabilities that support the extraction, aggregation and presentation of information to facilitate decision analysis and business evaluation. This Service Domain consists of 5 Service Types and 14 Components.

- **Back Office Services** – refers to the set of capabilities that support the management of enterprise planning transactional-based functions. This Service Domain consists of 6 Service Types and 41 Components.

- **Support Services** – refers to the set of cross-functional capabilities that can be leveraged independent of Service Domain objective or mission. This Service Domain consists of 6 Service Types and 28 Components.

Exhibit 6-3 –HUD SRM

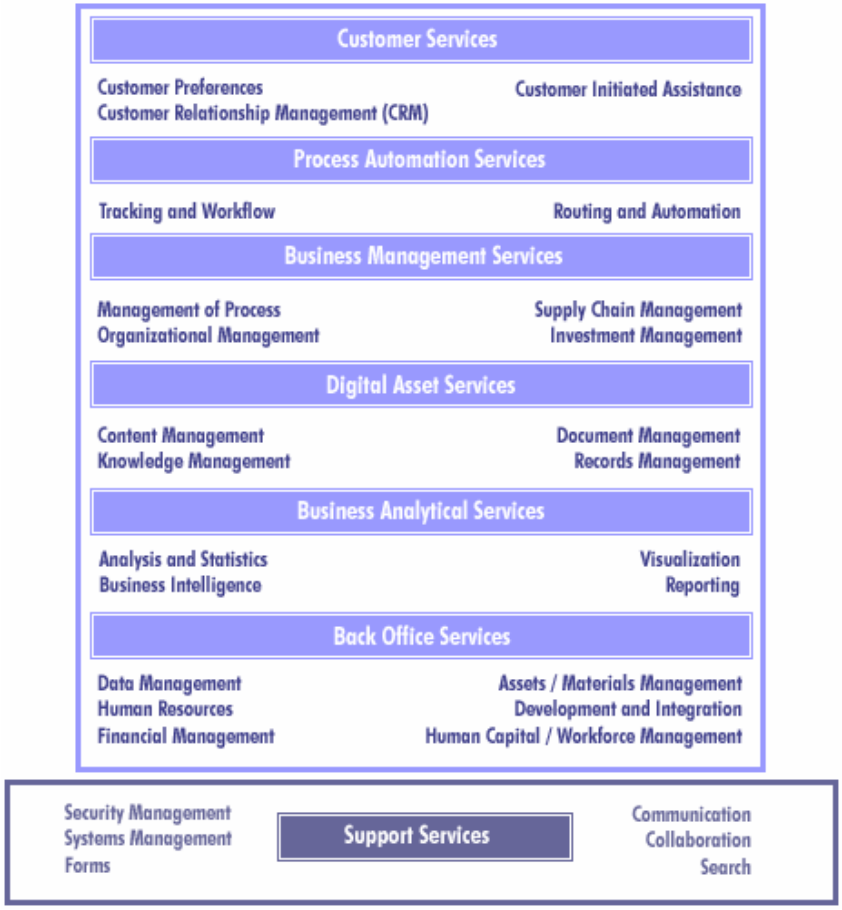
Customer Services	
Customer Preferences Customer Relationship Management	Customer Initiated Assistance
Process Automation Services	
Routing and Scheduling	Tracking and Workflow
Business Management Services	
Investment Management Organizational Management	Management of Process Supply Chain Management
Digital Asset Services	
Content Management Knowledge Management	Document Management Records Management
Business Analytical Services	
Analysis and Statistics Knowledge Discovery Visualization	Business Intelligence Reporting
Back Office Services	
Assets / Materials Management Development and Integration Human Capital / Workforce Management	Data Management Financial Management Human Resources
Support Services	
Collaboration Forms Management Security Management	Communication Search Systems Management

6.4 RELATIONSHIP TO THE FEDERAL ENTERPRISE ARCHITECTURE SRM

The HUD SRM is based on the FEA SRM. It follows the FEA taxonomy and encompasses the sub-set of components from the FEA SRM that are required

to support HUD's business. As a result, HUD's IT Investment Management (ITIM) process will be greatly facilitated, as part of the OMB Exhibit 300 business cases require the alignment of IT investments and assets to the FEA reference models. In addition, the ability to look across the government to discover reusable components and IT assets is increased as it is the same framework with which IT investments and assets are categorized both within HUD and across the Federal government. Exhibit 6-4 illustrates the FEA SRM.

Exhibit 6-4 –FEA SRM



6.5 HUD SERVICE COMPONENT REFERENCE MODEL DETAILS

The HUD SRM is comprised of 7 Service Domains, 30 Service Types and 142 Components. The components within the HUD SRM represent the core functionality that will be used to facilitate HUD's business functions and

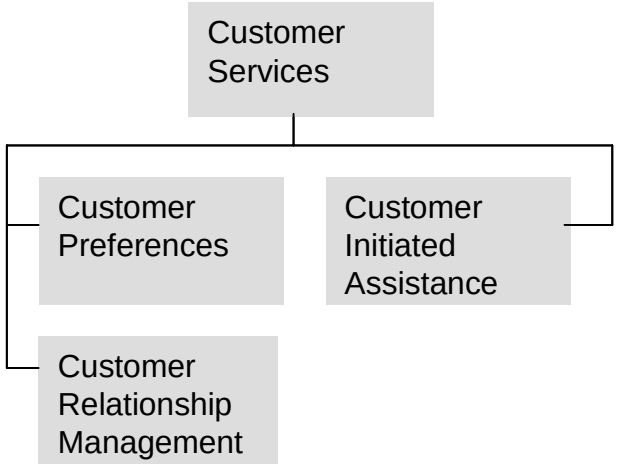
application capabilities. These capabilities are both functional - supporting specific business functions, and cross-cutting – usable across many business functions and capabilities.

The seven Service Domains are each differentiated by the business and application-oriented capability they represent. The Service Domains, Types and Components of the HUD SRM are defined in detail in the sections below:

6.5.1 Customer Services Domain

The ***Customer Services*** domain refers to the set of capabilities that are directly related to the end customer, the interaction between the business and the customer, and the customer-driven activities or functions. This Service Domain consists of 3 Service Types and 12 Components.

Exhibit 6-5 – Customer Services Domain



Customer Preferences - defines the set of capabilities that allow an organization's customers to change a user interface and the way that data is displayed.

- Personalization – defines the set of capabilities to change a user interface and how data is displayed.
- Alerts and Notifications – defines the set of capabilities that allow a customer to be contacted in relation to a subscription or service of interest.

Customer Initiated Assistance - defines the set of capabilities that allow customers to proactively seek assistance and service from an organization.

- Online Help – defines the set of capabilities that provide an electronic interface to customer assistance.
- Self-Service – defines the set of capabilities that allow an organization's customers to sign up for a particular service at their own initiative.
- Multi-Lingual Support – defines the set of capabilities that allow access to data and information in multiple languages.

Customer Relationship Management - defines the set of capabilities that are used to plan, schedule and control the activities between the customer and the enterprise both before and after a product or service is offered.

- Call Center Management – defines the set of capabilities that handle telephone sales and/or service to the end customer.
- Customer Analytics – defines the set of capabilities that allow for the analysis of an organization's customers as well as the scoring of third party information as it relates to an organization's customers.
- Customer / Account Management – defines the set of capabilities that support the retention and delivery of a service or product to an organization's clients.
- Contact and Profile Management – defines the set of capabilities that provide a comprehensive view of all customer interactions, including calls, email, correspondence and meetings; also provide for the maintenance of a customer's account, business and personal information.
- Partner Relationship Management – defines the set of capabilities that provide a framework to promote the effective collaboration between an organization and its business partners, particularly members of the distribution chain (e.g. Channel and alliance partners, resellers, agents, brokers and dealers) and other third parties that support operations and service delivery to an organization's customers.

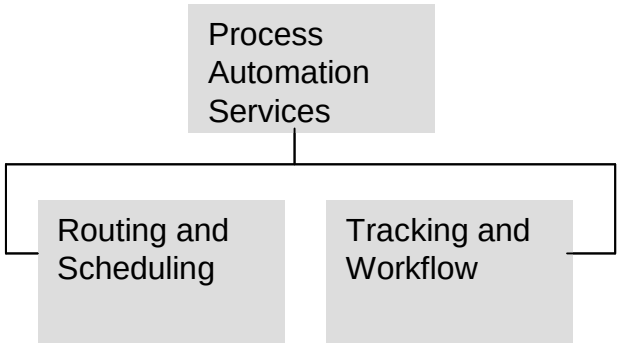
- Customer Feedback – defines the set of capabilities that are used to collect, analyze and handle comments and feedback from an organization's customers.

- Surveys – defines the set of capabilities that are used to collect useful information from an organization's customers.

6.5.2 Process Automation Services Domain

The ***Process Automation Services*** domain refers to the set of capabilities that support the automation of process and management activities that assist in effectively managing the business. This Service Domain consists of 2 Service Types and 5 Components.

Exhibit 6-6 – Process Automation Services Domain



Routing and Scheduling - defines the set of capabilities for the automatic directing, assignment, or allocation of time for a particular action or event.

- Inbound Correspondence Management – defines the set of capabilities for the management of externally initiated communication between an organization and its stakeholders.

- Outbound Correspondence Management – defines the set of capabilities for the management of internally initiated communication between an organization and its stakeholders.

Tracking and Workflow - defines the set of capabilities for automatic monitoring and routing of documents to the users responsible for working on them to support each step of the business cycle.

- Case / Issue Management – defines the set of capabilities for managing the life cycle of a particular claim or investigation within an organization to include creating, routing, tracing, assignment and closing of a case as well as collaboration among case handlers.

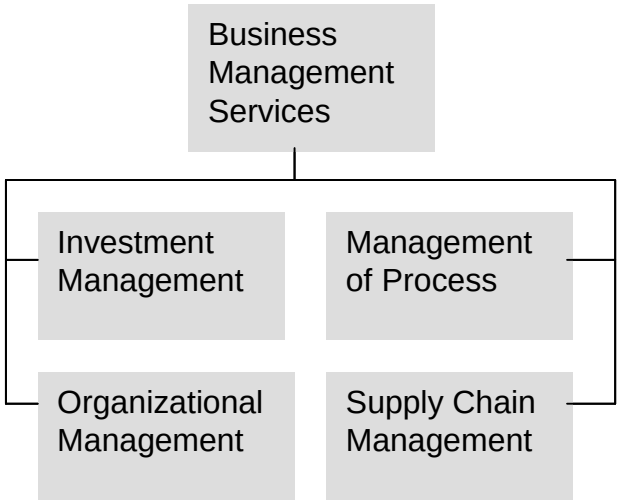
- Conflict Resolution – defines the set of capabilities that support the conclusion of contention or differences within the business cycle.

- Process Tracking – defines the set of capabilities to allow the monitoring of activities within the business cycle.

6.5.3 Business Management Services Domain

The ***Business Management Services*** domain refers to the set of capabilities that support the management and execution of business functions and organizational activities that maintain continuity across the business and value-chain participants. This Service Domain consists of 4 Service Types and 18 Components.

Exhibit 6-7 – Business Management Services Domain



Investment Management - defines the set of capabilities that manage the financial assets and capital of an organization.

- Strategic Planning & Mgmt – defines the set of capabilities that support the determination of long-term goals and the identification of the best approach for achieving those goals.

- Portfolio Management – defines the set of capabilities that support the administration of a group of investments held by an organization.

- Performance Management – defines the set of capabilities for measuring the effectiveness of an organization's financial assets and capital.

Management of Process - defines the set of capabilities that regulate the activities surrounding the business cycle of an organization.

- Business Rule Management – defines the set of capabilities for the management of the enterprise processes that support an organization and its policies.

- Change Management – defines the set of capabilities that control the process for updates or modifications to the existing documents, software or business processes of an organization.

- Configuration Management – defines the set of capabilities that control the hardware and software environments, as well as documents of an organization.

- Governance / Policy Management – defines the set of capabilities intended to influence and determine decisions, actions, business rules and other matters within an organization.

- Program / Project Management – defines the set of capabilities for the management and control of a particular effort of an organization.

- Quality Management – defines the set of capabilities intended to help determine the level of assurance that a product or service will satisfy certain requirements.

- Risk Management – defines the set of capabilities that support the identification and probabilities or chances of hazards as they relate to a task, decision or long-term goal.

Organizational Management – defines the set of capabilities that support both collaboration and communication within an organization.

- Network Management – defines the set of capabilities involved in monitoring and maintaining a communications network in order to diagnose problems, gather statistics and provide general usage.

- Workgroup/Groupware – defines the set of capabilities that support multiple users working on related tasks.

Supply Chain Management - defines the set of capabilities for planning, scheduling and controlling a supply chain and the sequence of organizations and functions that mine, make or assemble materials and products from manufacturer to wholesaler to retailer to consumer.

- Catalog Management – defines the set of capabilities that support the listing of available products or services that an organization offers.

- Inventory Management – defines the set of capabilities that provide the balancing of customer service levels with inventory investment.

- Ordering / Purchasing – defines the set of capabilities that allow the placement of request for a product.

- Procurement – defines the set of capabilities that support the ordering and purchasing of products and services.

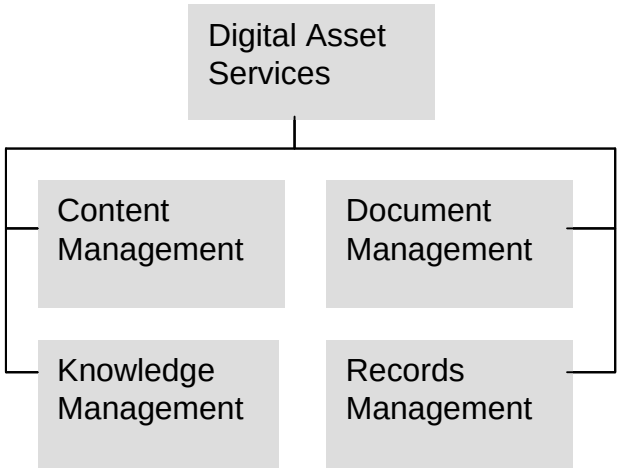
- Sourcing Management – defines the set of capabilities that support the supply of goods or services as well as the tracking and analysis of costs for these goods.

- Storefront / Shopping Cart – defines the set of capabilities that support the online equivalent of the supermarket cart, where orders and merchandise are placed.

6.5.4 Digital Asset Services Domain

The ***Digital Asset Services*** domain refers to the set of capabilities that support the generation, management and distribution of intellectual capital and electronic media across the business and extended enterprise. This Service Domain consists of 4 Service Types and 24 Components.

Exhibit 6-8 – Digital Asset Services Domain



Content Management – defines the capabilities that manage the storage, maintenance and retrieval of documents and information of a system or website.

- Content Authoring – defines the capabilities that allow for the creation of tutorials, CBT courseware, Web sites, CD-ROMs and other interactive programs.
- Content Publishing and Delivery – defines the set of capabilities that allow for the propagation of interactive programs.
- Content Review and Approval – defines the capabilities that allow for the approval of interactive programs.
- Tagging and Aggregation – defines the set of capabilities that support the identification of specific content within a larger set of content for collection and summarization.

Document Management – defines the set of capabilities that control the capture and maintenance of an organization's documents and files.

- Classification – defines the set of capabilities that support the categorization of documents.
- Document Conversion – defines the set of capabilities that support the changing of files from one type of format to another.

- Document Imaging and OCR – defines the set of capabilities that support the scanning of physical documents for use electronically.
- Document Referencing – defines the set of capabilities that support the redirection to other documents and information for related content.
- Document Review and Approval – defines the set of capabilities that support the editing and commendation of documents before releasing them.
- Document Revisions – defines the set of capabilities that support the versioning and editing of content and documents.
- Indexing – defines the set of capabilities that support the rapid retrieval of documents through a structured numbering construct.
- Library / Storage – defines the set of capabilities that support document and data warehousing and archiving.

Knowledge Management - defines the set of capabilities that support the identification, gathering and transformation of documents, reports and other sources into meaningful information.

- Categorization – defines the set of capabilities that allow classification of data and information into specific layers or types to support an organization.
- Information Mapping / Taxonomy – defines the set of capabilities that support the creation and maintenance of relationships between data entities, naming standards and categorization.
- Information Retrieval – defines the set of capabilities that allow access to data and information for use by an organization and its stakeholders.
- Information Sharing – defines the set of capabilities that support the use of documents and data in a multi-user environment for use by an organization and its stakeholders.
- Knowledge Capture – defines the set of capabilities that facilitate collection of data and information.

- Knowledge Discovery - defines the set of capabilities that facilitate the identification of useful information from data.
- Knowledge Distribution and Delivery - defines the set of capabilities that support the transfer of knowledge to the end customer.
- Knowledge Engineering – defines the set of capabilities that support the translation of knowledge from an expert into the knowledge base of an expert system.
- Smart Documents – defines the set of capabilities that support the interaction of information and process (business logic) rules between users of the document. (i.e. the logic and use of the document is embedded within the document itself and is managed within the document.

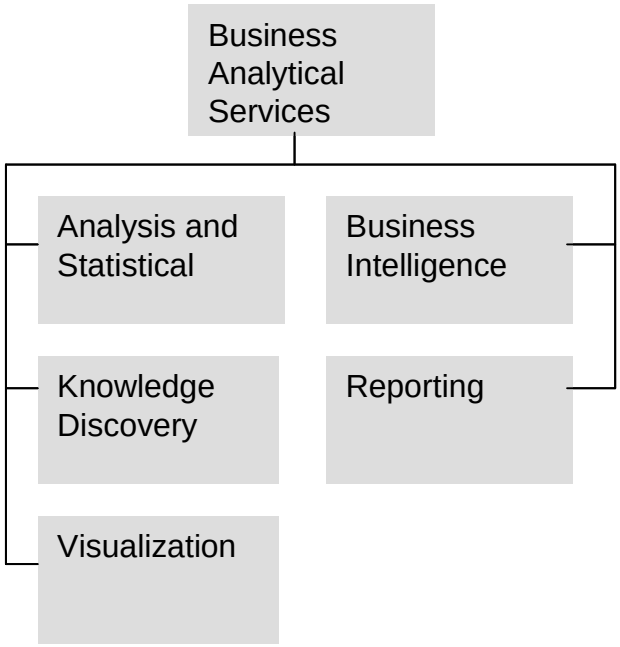
Records Management - defines the set of capabilities to support the storage, protection, archiving, classification and retirement of documents and information.

- Document Classification – defines the set of capabilities that support the categorization of documents and artifacts, both electronic and physical.
- Document Retirement – defines the set of capabilities that support the termination or cancellation of documents and artifacts used by an organization and its stakeholders.
- Record Linking / Association - defines the set of capabilities that support the correlation between logical data and information sets.

6.5.5 Business Analytical Service Domain

The ***Business Analytical Services*** domain refers to the set of capabilities that support the extraction, aggregation and presentation of information to facilitate decision analysis and business evaluation. This Service Domain consists of 5 Service Types and 14 Components.

Exhibit 6-9 – Business Analytical Services Domain



Analysis and Statistics - defines the set of capabilities that support the examination of business issues, problems and their solutions.

- Mathematical – defines the set of capabilities that support the use of mathematical functions and algorithms for the analysis of data.
- Predictive – defines the set of capabilities that support the foretelling of something in advance by the use of data.

Business Intelligence - defines the set of capabilities that support information that pertains to the history, current status or future projections of an organization.

- Balanced Scorecard – defines the set of capabilities that support the listing and analyzing of both positive and negative impacts associated with a decision.
- Decision Support and Planning – defines the set of capabilities that support the analysis of information and predict the impact of decisions before they are made.

Knowledge Discovery - defines the set of capabilities that facilitate the identification of useful information from data.

- Data Mining – defines the set of capabilities that provide for the efficient discovery of non-obvious, valuable patterns and relationships within a large collection of data.
- Simulation – defines the set of capabilities that Utilize models to mimic real-world processes.
- Modeling – defines the set of capabilities that Develop descriptions to adequately explain relevant data for the purpose of prediction, pattern detection, exploration or general organization of data.

Reporting - defines the set of capabilities that support the organization of data into useful information.

- Ad Hoc – defines the set of capabilities that support the use of dynamic reports on an as needed basis.
- Standardized / Canned – defines the set of capabilities that support the use of pre-conceived or pre-written reports.
- OLAP - defines the set of capabilities that support the analysis of information that has been summarized into multidimensional views and hierarchies.

Visualization - defines the set of capabilities that support the conversion of data into graphical or picture form.

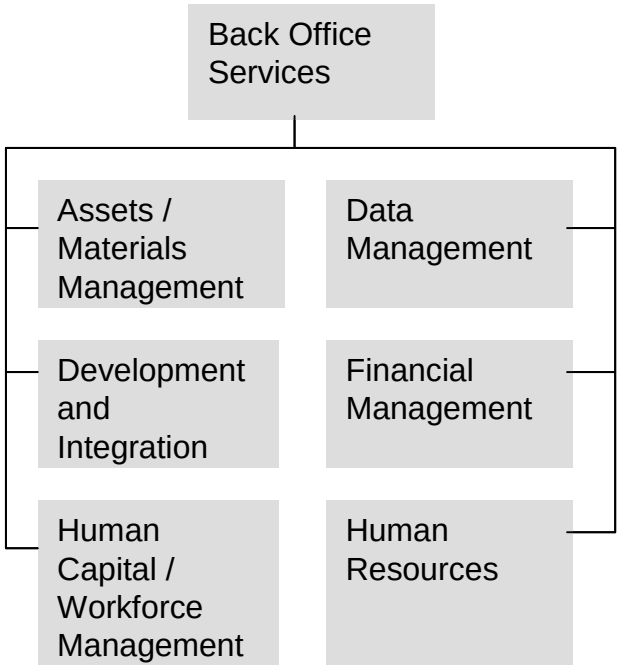
- Graphing / Charting – defines the set of capabilities that support the presentation of information in the form of diagrams or tables.
- Imagery – defines the set of capabilities that support the creation of film or electronic images from pictures, paper forms or graphics for static or dynamic use.
- Multimedia – defines the set of capabilities that support the representation of information in more than one form to include text, audio, graphics, animated graphics and full motion video.

- Mapping / Geospatial / Elevation / GPS - provides for the representation of position information through the use of attributes such as elevation, latitude, and longitude coordinates.

6.5.6 Back Office Services Domain

The ***Back Office Services*** domain refers to the set of capabilities that support the management of enterprise planning transactional-based functions. This Service Domain consists of 6 Service Types and 41 Components.

Exhibit 6-10 – Back Office Services Domain



Assets / Materials Management – defines the set of capabilities that support the acquisition, oversight and tracking of an organization's assets.

- Asset Cataloging / Identification – defines the set of capabilities that support the listing and specification of available assets.

- Asset Transfer, Allocation, and Maintenance – defines the set of capabilities that support the movement, assignment, and replacement of assets.

- Computers / Automation Management – defines the set of capabilities that support the identification, upgrade, allocation and replacement of physical devices, including servers and desktops, used to facilitate production and process-driven activities.

- Facilities Management – defines the set of capabilities that support the construction, management and maintenance of facilities for an organization.

- Property / Asset Management – defines the set of capabilities that support the identification, planning and allocation of an organization's physical capital and resources.

Data Management - defines the set of capabilities that support the usage, processing and general administration of unstructured information.

- Data Classification – defines the set of capabilities that allow the classification of data.

- Data Cleansing – defines the set of capabilities that support the removal of incorrect or unnecessary characters and data from a data source.

- Data Exchange – defines the set of capabilities that support the interchange of information between multiple systems or applications.

- Data Mart – defines the set of capabilities that support a subset of a data warehouse for a single department or function within an organization.

- Data Warehouse – defines the set of capabilities that support the archiving and storage of large volumes of data.

- Extraction and Transformation – defines the set of capabilities that support the manipulation and change of data.

- Loading and Archiving – defines the set of capabilities that support the population of a data source with external data.

- Meta Data Management – defines the set of capabilities that support the maintenance and administration of data that describes data.

Development and Integration - defines the set of capabilities that support the communication between hardware/software applications and the activities associated with deployment of software applications.

- Data Integration – defines the set of capabilities that support the organization of data from separate data sources into a single source using middleware or application integration as well as the modification of system data models to capture new information within a single system.

- Enterprise Application Integration – defines the set of capabilities that support the redesigning of disparate information systems into one system that uses a common set of data structures and rules.

- Instrumentation and Testing – defines the set of capabilities that support the validation of application or system capabilities and requirements.

- Software Development – defines the set of capabilities that support the creation of both graphical and process application and system software.

Financial Management - defines the set of capabilities that support the accounting practices and procedures that allow for the handling of revenues, funding and expenditures.

- Activity – Based Management – defines the set of capabilities that support a defined, specific set of finance-related tasks for a given objective.

- Auditing – defines the set of capabilities that support the examination and verification of records for accuracy.

- Billing and Accounting – defines the set of capabilities that support the charging, collection and reporting of an organization's accounts.

- Credit / Charge – defines the set of capabilities that support the use of credit cards or electronic funds transfers for payment and collection of products or services.

- Debt Collection – defines the set of capabilities that support the process of accounts receivable.

- Expense Management – defines the set of capabilities that support the management and reimbursement of costs paid by employees or an organization.

- Internal Controls – defines the set of capabilities that support the methods and procedures used by the organization to safeguard its assets, produce accurate accounting data and reports, contribute to efficient operations, and encourage staff to adhere to management policies.

- Payment / Settlement – defines the set of capabilities that support the process of accounts payable.

- Revenue Management – defines the set of capabilities that support the allocation and re-investment of earned net credit or capital within an organization.

Human Capital / Workforce Management – defines the set of capabilities that support the planning and supervision of an organization's personnel.

- Contingent Workforce Management – defines the set of capabilities that support the continuity of operations for an organization's business through the identification of alternative organization personnel.

- Resource Planning and Allocation – defines the set or capabilities that support the means for assignment of employees and assets to sustain or increase an organization's business.

- Skills Management – defines the set of capabilities that support the proficiency of employees in the delivery of an organization's products or services.

- Team / Org Management – defines the set of capabilities that support the hierarchy structure and identification of employees within the various sub-groups of an organization.

- Workforce Acquisition / Optimization – defines the set of capabilities that support the hiring and re-structuring of employees and their roles within an organization.

- Workforce Directory / Locator – defines the set of capabilities that support the listing of employees and their whereabouts.

Human Resources - defines the set of capabilities that support the recruitment and management of personnel.

- Benefit Management – defines the set of capabilities that support the enrollment and participation in an organization's compensation and benefits programs.

- Career Development and Retention – defines the set of capabilities that support the monitoring of performance as well as the professional growth, advancement, and retention of an organization's employees.

- Education / Training – defines the set of capabilities that support the active building of employee capacities.

- Personnel Administration – defines the set of capabilities that support the matching between an organization's employees and potential opportunities as well as the modification, addition and general upkeep of an organization's employee-specific information.

- Recruiting – defines the set of capabilities that support the identification and hiring of employees for an organization.

- Resume Management – defines the set of capabilities that support the maintenance and administration of one's professional or work experience and qualifications.

- Retirement Management - defines the set of capabilities that support the payment of benefits to retirees.

- Time Reporting – defines the set of capabilities that support the submission, approval and adjustment of an employee's hours.

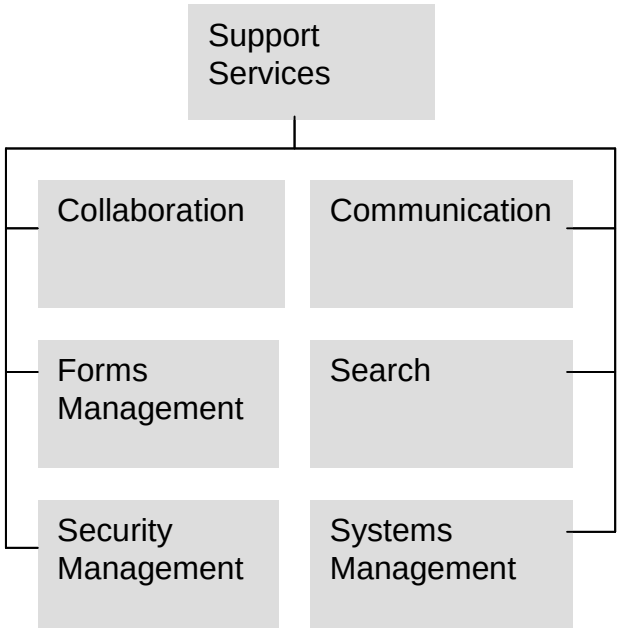
- Travel Management – defines the set of capabilities that support the transit and mobility of an organization's employees for business purposes.

6.5.7 Support Services Domain

The ***Support Services*** domain refers to the set of cross-functional capabilities that can be leveraged independent of Service Domain objective

or mission. This Service Domain consists of 6 Service Types and 28 Components.

Exhibit 6-11 – Support Services Domain



Collaboration – defines the set of capabilities that allow for the concurrent, simultaneous communication and sharing of content, schedules, messages and ideas within an organization.

- Document Library – defines the set of capabilities that support the grouping and archiving of files and records on a server.
- Email - defines the set of capabilities that support the transmission of memos and messages over a network.
- Shared Calendaring – defines the set of capabilities that allow an entire team as well as individuals to view, add and modify each other's schedules, meetings and activities.
- Task Management – defines the set of capabilities that support a specific undertaking or function assigned to an employee.
- Threaded Discussions – defines the set of capabilities that support the running log of remarks and opinions about a given topic or subject.

Communication - defines the set of capabilities that support the transmission of data, messages and information in multiple formats and protocols.

- Community Management - defines the set of capabilities that support the administration of online groups that share common interests.
- Computer / Telephony Integration - defines the set of capabilities that support the connectivity between server hardware, software and telecommunications equipment into a single logical system.
- Event / News Management – defines the set of capabilities that monitor servers, workstations and network devices for routine and non-routine events.
- Instant Messaging – defines the set of capabilities that support keyboard conferencing over a Local Area Network or the internet between two or more people.
- Real Time / Chat – defines the set of capabilities that support the conferencing capability between two or more users on a local area network or the internet.

Forms Management – defines the set of capabilities that support the creation, modification and usage of physical or electronic documents used to capture information within the business cycle.

- Forms Creation – defines the set of capabilities that support the design and generation of electronic or physical forms and templates for use within the business cycle by an organization and its stakeholders.
- Forms Modification – defines the set of capabilities that support the maintenance of electronic or physical forms, templates and their respective elements and fields.

Search - defines the set of capabilities that support the probing and lookup of specific data from a data source.

- Classification – defines the set of capabilities that support selection and retrieval of records organized by shared characteristics in content or context.

- Precision / Recall Ranking – defines the set of capabilities that support selection and retrieval of records ranked to optimize precision against recall.

- Query – defines the set of capabilities that support retrieval of records that satisfy specific query selection criteria.

Security Management – defines the set of capabilities that support the protection of an organization's hardware/software and related assets.

- Access Control – defines the set of capabilities that support the management of permissions for logging onto a computer or network.

- Audit Trail Capture and Analysis – defines the set of capabilities that support the identification and monitoring of activities within an application or system.

- Digital Signature – defines the set of capabilities that guarantee the unaltered state of a file.

- Encryption – defines the set of capabilities that support the encoding of data for security purposes.

- Identification and Authentication – defines the set of capabilities that support obtaining information about those parties attempting to log on to a system or application for security purposes and the validation of those users.

- Intrusion Detection – defines the set of capabilities that support the detection of illegal entrance into a computer system.

- Role / Privilege Management – defines the set of capabilities that support the granting of abilities to users or groups of users of a computer, application or network.

- User Management – defines the set of capabilities that support the administration of computer, application and network accounts within an organization.

- Verification – defines the set of capabilities that support the confirmation of authority to enter a computer system, application or network.

Systems Management – defines the set of capabilities that support the administration and upkeep of an organization's technology assets, including the hardware, software, infrastructure, licenses and components that comprise those assets.

- License Management – defines the set of capabilities that support the purchase, upgrade and tracking of legal usage contracts for system software and applications.
- Remote Systems Control – defines the set of capabilities that support the monitoring, administration and usage of applications and enterprise systems from locations outside of the immediate system environment.
- Software Distribution – defines the set of capabilities that support the propagation, installation and upgrade of written computer programs, applications and components.
- System Resource Monitoring – defines the set of capabilities that support the balance and allocation of memory, usage, disk space and performance on computers and their applications.

6.6 APPLICATIONS AND SERVICES OPPORTUNITIES ANALYSIS

The future state of HUD's applications and services will be implemented through a service-oriented architecture. This is consistent with the goal of HUD's Office of the CIO (OCIO), and its desire to lead HUD towards using a service-oriented architecture. A first step in this transformational process is the analysis of existing applications across HUD and the service components that they comprise.

An analysis of the alignment of HUD's current applications to Target SRM components (See Appendix H) resulted in the identification of applications that share similar capabilities. This serves as a valuable point of analysis for IT asset reuse and integration, as well as the transition towards sharing business and application services among HUD's applications in a service-oriented architecture.

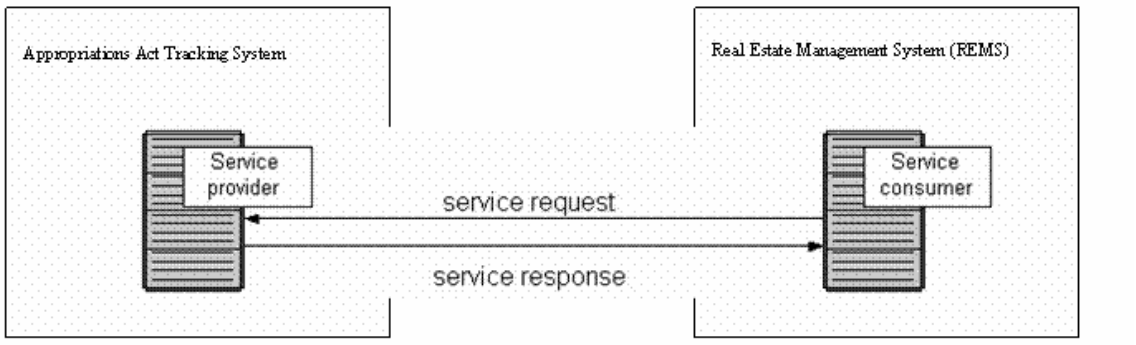
To illustrate how services can be shared between applications, consider Process Tracking, a Tracking and Workflow component within the Process Automation Service Domain. An analysis of the components that make up HUD's applications revealed that Process Tracking is a component that exists

within approximately 60 different applications across HUD. A more centralized service, such as Process Tracking, can be achieved through the use of that service within the most preferred environment. As an example, the Appropriations Act Tracking System could serve as the central Process Tracking service provider for other applications, among which is the Real Estate Management System (REMS).

By reducing the number of duplicative components across HUD's applications, HUD can reduce the costs associated with maintaining those components separately. This also allows HUD to maintain a consistent technology base and access channels for those shared components and services that are aligned with HUD's target Technology Layer. In addition, HUD will be in a better position to manage the licenses and technology that support the services and capabilities of its business.

There may not be a "one size fits all" for shared services. However, to improve upon the efficiency and cost savings of delivering business and application capabilities, HUD will pursue opportunities to share and reuse components. These opportunities have been further explored in development of the EA Transition Plan, and will be realized through the development and implementation of segment architectures. The concept of a shared service is illustrated in Exhibit 6-12.

Exhibit 6-12 – Process Tracking as a Shared Service



When considering services that can be shared across applications, HUD will consider a number of factors, such as criticality to the business, potential financial impact, etc., when determining which sharing and reuse opportunities to pursue first. The following matrix identifies components, by number of application, most common to HUD's applications:

Exhibit 6-13 – Common Components by Number of Applications

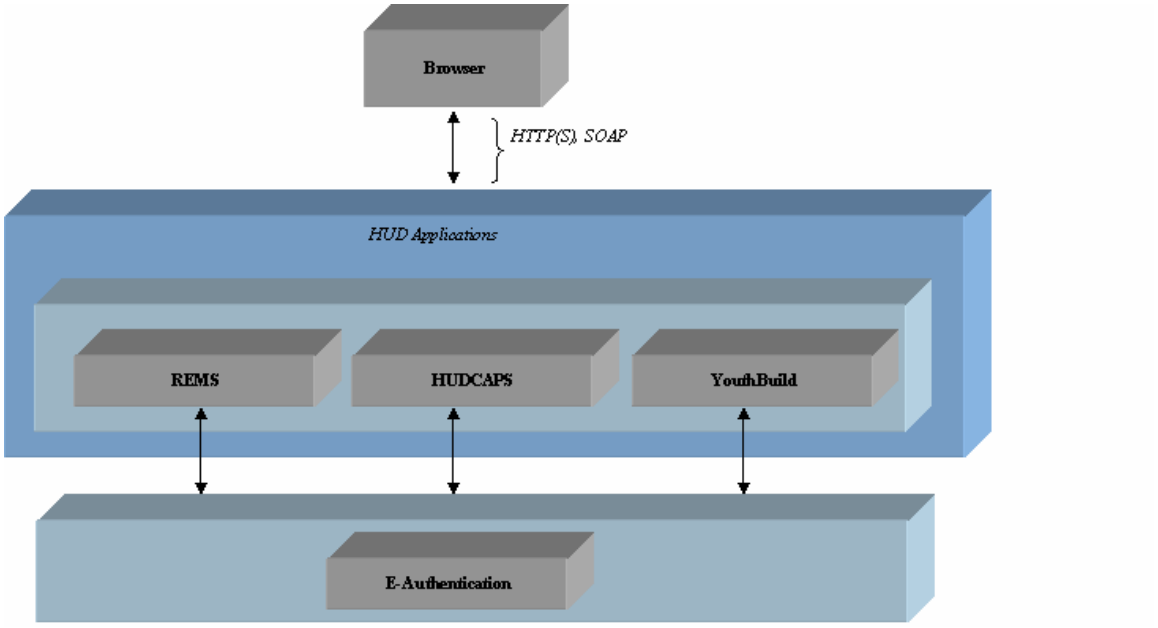
Application Count	Service Domain	Service Type	Component
60	Process Automation Services	Tracking and Workflow	Process Tracking
45	Process Automation Services	Tracking and Workflow	Case / Issue Management
37	Business Analytical Services	Reporting	Standardized / Canned
34	Digital Asset Services	Knowledge Management	Knowledge Capture
30	Customer Services	Customer Relationship Management	Partner Relationship Management
25	Digital Asset Services	Knowledge Management	Information Retrieval
24	Digital Asset Services	Knowledge Management	Information Sharing
23	Back Office Services	Financial Management	Billing and Accounting
22	Back Office Services	Financial Management	Internal Controls
21	Business Analytical Services	Reporting	Ad-Hoc
18	Digital Asset Services	Document Management	Library / Storage
16	Back Office Services	Data Management	Data Exchange
15	Back Office Services	Human Resources	Personnel Administration
15	Customer Services	Customer Relationship Management	Customer Analytics
14	Back Office Services	Financial Management	Debt Collection
14	Business Management Services	Management of Process	Program / Project Management
13	Back Office Services	Financial Management	Activity-Based Management
13	Customer Services	Customer Relationship Management	Surveys
13	Support Services	Collaboration	Document Library
13	Support Services	Forms Management	Forms Creation
12	Back Office Services	Financial Management	Payment / Settlement
12	Digital Asset Services	Knowledge Management	Knowledge Distribution and Delivery
11	Business Management Services	Management of Process	Business Rule Management
10	Back Office Services	Assets / Materials Management	Property / Asset Management
10	Back Office Services	Human Capital / Workforce Management	Resource Planning and Allocation
10	Business Management	Investment	Portfolio Management

Application Count	Service Domain	Service Type	Component
	Services	Management	
10	Support Services	Collaboration	Email
10	Support Services	Communication	Community Management
10	Support Services	Search	Query

*Note: HUD's *Strategic Portfolio Review,* conducted to support the FY07 ITIM Select process, provides a more detailed analysis of those existing components that are capable of being shared and reused between HUD's applications.

Another opportunity for HUD is to integrate with and leverage government-wide services and initiatives, such as the Presidential Priority E-Gov initiatives and LOB initiatives. This would involve the integration and implementation of common services that are provided by such a government-wide initiative into HUD's application and services layer. As an example, consider the e-Authentication E-Gov initiative. This initiative provides authentication and identification through a service that enables a user to access agency-wide resources through a single sign-on mechanism, where applicable. Instead of building authentication into every application separately, HUD could use a single service across its applications and resources to authenticate application and resource users. Exhibit 6-14 illustrates the concept of integration with the E-Gov initiatives. For more information on government-wide initiatives, see http://www.whitehouse.gov/omb/egov/c-presidential.html.

Exhibit 6-14 – E-Gov / HUD Integration



7 DATA LAYER

7.1 INTRODUCTION

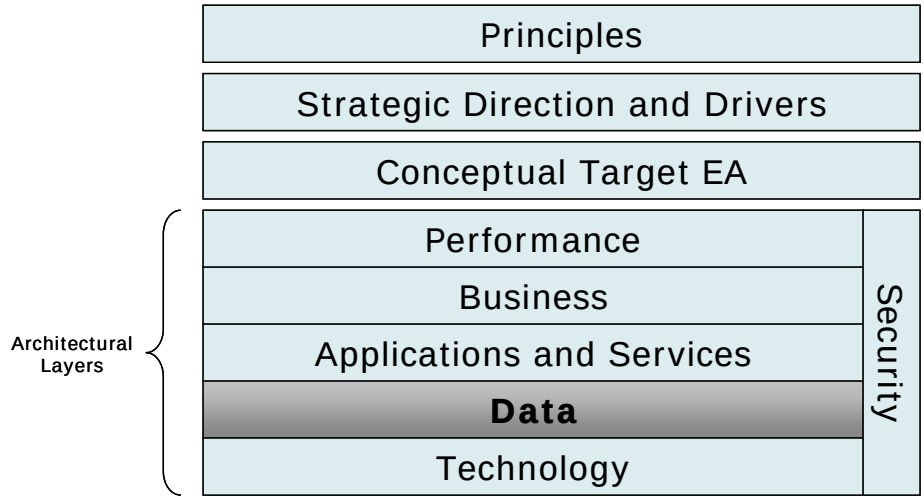
The Data Reference Model (DRM) represents the Enterprise Data Layer of the HUD Target Enterprise Architecture (EA). The DRM describes key information assets (i.e., data) that support HUD's business functions and are managed by HUD's applications. The DRM assists in the identification of common data and promotes data reuse, and sharing across HUD.

This document describes the structure and content of the DRM. The DRM is structured in three layers: Business Context, Data Exchange, and Data Structure, as shown in Exhibit 7-2. Section 7.2, DRM Structure, describes the structure of the DRM. Section 7.3, Technical Approach, describes the technical approach used by the EA analyst team to populate the Business Context Layer. Section 7.4, DRM Data Categorization, describes the Business Context layer of the DRM. Refining and augmenting HUD's DRM is an ongoing and iterative process. The next steps to refine and augment the DRM are described in Section 7.5.

HUD's DRM reflects the Federal Enterprise Architecture (FEA) goals of information sharing and the improved effectiveness of federal IT investments. Each layer of the DRM maps directly to the Federal Enterprise Architecture (FEA) DRM structure. The DRM also aligns with HUD's EA Business Reference Model, as shown in Appendix L.

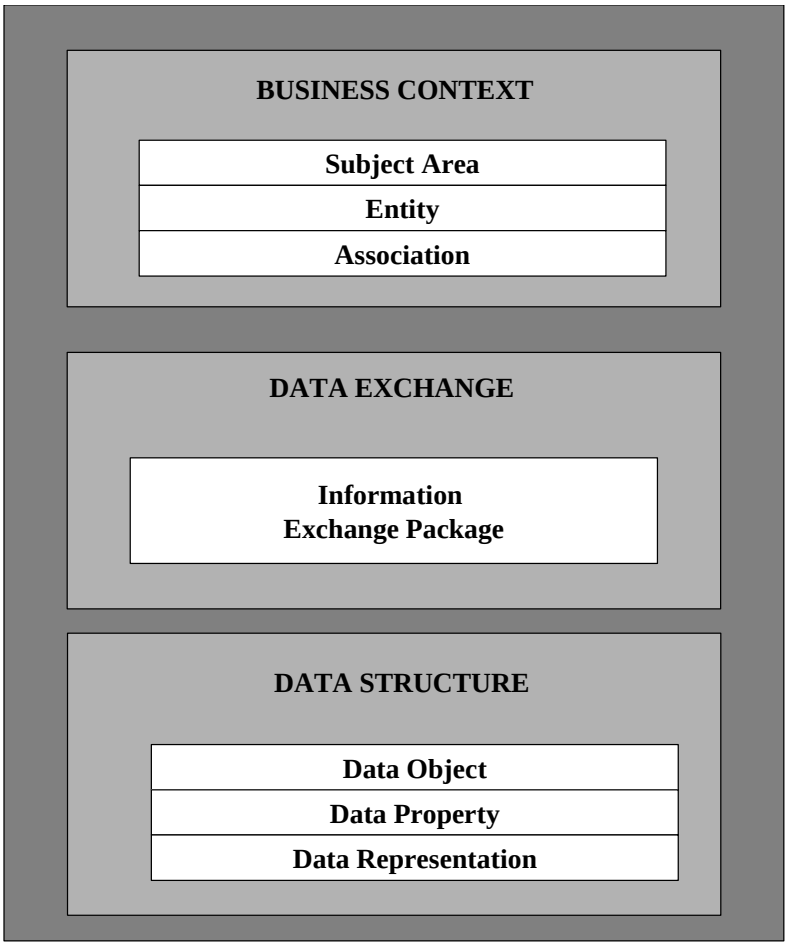
Exhibit 7-1 shows how the Data layer fits into the overall HUD Target EA framework.

Exhibit 7-1 - Target EA Framework: Data



7.2 DRM STRUCTURE

Exhibit 7-2–DRM Structure



The DRM is structured in three layers: Business Context, Data Exchange, and Data Structure.

7.2.1 Business Context Layer

The DRM Business Context layer defines the key information assets of HUD, using a Conceptual Data Model (CDM) that includes subject areas, entities, and associations.

- Subject Area - defines a collection of closely related entities organized around one or more central entities. A subject area contains one or more entities.

- Entity – defines logical collections of data in which HUD is interested. An entity can represent a person, place, thing, concept or event of interest to HUD in performing one or more business functions. An entity is contained in a subject area, and can be related to one or more entities.

- Association – defines a relationship that exists between two entities, or a relationship to the entity itself.

The DRM's Business Context layer allows HUD to map a collection of data to the HUD's BRM and identify data stewards. Architects will identify opportunities for reuse of available data based on its categorization.

7.2.2 Data Exchange Layer

The DRM Data Exchange layer defines the packages of information that are communicated or passed between business processes. These data flows are referred to as "Information Exchange Packages".

Information Exchange Packages (IEP) allow HUD to identify sets of data transmitted for specific business purposes. HUD can map the IEP to the HUD TRM to foster collaboration and interoperability standards, which often depend on both data and technology standards.

7.2.3 Data Structure Layer

The DRM Data Structure layer is a further refinement of the data, specifically the entities, in the Business Context layer. The Data Object is a set of ideas, abstractions or things that can be identified with explicit boundaries. The Data Property is a characteristic or attribute of the Data Object. The Data Representation describes how the data is represented (value domain + data type), and is selected from a controlled word list. The controlled word list is generated based on common formats of data within the government. Value domains can be included when a data element is defined at time of data exchange, but this is optional.

HUD will use the DRM's Data Structure layer to publish the structure of data for purposes of reuse, collaboration, and adherence to data standards.

7.2.4 Scope

This initial version of the HUD DRM establishes the taxonomy for categorizing data and provides a foundation for HUD to further refine its data architecture. The development of Segment Architecture Blueprints will address the identification and documentation of information exchange packages. Future versions of the DRM will address the identification and validation of data structures.

7.3 TECHNICAL APPROACH

The strategy used for establishing the HUD DRM consisted of defining a stable conceptual HUD data model to be extended through segment architecture development and enterprise architecture development and maintenance.

The EA Practice used the 1997 Information Strategy Plan (ISP) Conceptual Data Model (CDM) as a starting point, entering all entities and relationships into the AllFusion ERwin data-modeling tool. Even though known deficiencies exist in the 1997 CDM (e.g., information technology is not modeled), the Practice believed that the data represented in the CDM was a good starting point and that the data for doing HUD business has not changed substantially since 1997.

There are a large number of entities defined in the 1997 ISP (i.e., 133 entities, and over 340 relationships). In order to understand the data, the Practice grouped entities into areas around 13 central entities. The central entities were identified based on the number of entity relationships. These central entities became the foundation for the DRM subject areas. The subject areas were analyzed to determine if they mapped to HUD's Business Areas, as identified in the 1997 ISP Cluster Interaction Matrix. Business Areas are "clusters" of business functions which create or update entity types. Some subject areas were merged together, while others were decomposed. Each area was mapped to a HUD Business Area, and to the HUD BRM. For each subject area, the Practice identified a proposed data steward and participating data steward(s) as defined in Section 7.3.2, Subject Area Stewards.

The HUD Data Control Board (DCB) validated the proposed subject areas, corresponding entities, mapping of HUD DRM subject areas to Business

Areas, mapping of HUD DRM subject areas to HUD BRM, and proposed lead and participating data stewards. The Practice revised DRM subject areas, entity taxonomy, and BRM mappings using the DCB's feedback.

7.4 DRM DATA CATEGORIZATION

This section populates the DRM's Business Context layer. The Business Context layer consists of the subject areas, entities, and associations as defined in this section.

7.4.1 Subject Area Overview

HUD's data is organized into 12 subject areas. A Subject Area is a conceptual category or summarization of data in which HUD is interested, consisting of one or more entities, with entities related to one another by associations.

The HUD DRM Subject Areas align with the HUD EA BRM, as shown in Appendix L.

HUD's subject areas are briefly defined below, and are further defined in detail in the *Subject Area Details* section.

- **Acquisitions Management** – organizes data about contractor services, including contractor organizations, products or services produced by a contractor, and the contract mechanisms for requesting contractor services to meet HUD's needs.
- **Facilities Management** – organizes data about the operation and maintenance of office space, equipment, and supplies needed for the purpose of conducting HUD business.
- **Financial Management** – organizes data about all of HUD's financial events, including budget execution, funds allocation and control.
- **Grants Management** – organizes data about all activities that initiate a grant for financial assistance and allow a grantee to draw funds.
- **Human Resources** – organizes data about the HUD work force including hiring, compensating, managing, training, and terminating employees. This includes activities in planning, developing, and conducting training courses for internal employees.

- **Legal Enforcement** – organizes data about legal cases against those who violate HUD program requirements.
- **Loan Management** – organizes data about activities in administering and overseeing HUD's housing insurance and direct loan programs.
- **Program Management** – organizes data about identifying program needs, defining and refining programs, assessing how well each program or product is meeting its mission and objectives, and resolving those issues that cross program lines and need resolution at higher levels. This includes developing the strategic direction, defining performance measures, and monitoring the overall performance of the Department.
- **Properties, Locations & Demographics** – organizes data about physical property and the analysis of economic and housing-related subjects.
- **Public Affairs** – organizes data about planning and management activities related to communicating with the public. This includes activities in planning, developing, and conducting training courses for the public.
- **Records Management** – organizes data about HUD's information resources including data warehouses, documents, communications, and official records.
- **Rental Assistance** – organizes data about all activities that initiate a contract for rental assistance and allow a tenant to receive assistance.

7.4.2 Subject Area Stewards

The HUD DRM Subject Areas are assigned data stewards, as shown in Exhibit 7-3. Stewards have the responsibility for managing the data for which they are accountable. Additionally, stewards are responsible for maintaining and extending the subject areas and entities for which they have responsibility. Some subject areas have participating data stewards. Participating data stewards are key users of the data whose requirements must be considered by principal data stewards.

Exhibit 7-3 –DRM Subject Area Stewards

Subject Area (SA)	Steward	Participating Steward
Acquisitions Management	OPC	
Facilities Management	Admin	
Financial Management	CFO	
Grants Management	Grants Management Segment	all organizations that have grant programs
Human Resources	Admin	
Legal Enforcement	OGC	
Loan Management	Housing	GNMA
Programs Management	undetermined	
Properties, Locations & Demographics	undetermined	Demographics - PD&R Properties, Locations - all Lines of Business Segments
Public Affairs	Public Affairs	
Records Management	Admin	
Rental Assistance	PIH, MFH, and Rental Assistance Segment	

7.4.3 Subject Area Details

The HUD DRM is comprised of 12 Subject Areas, including over 130 entities.

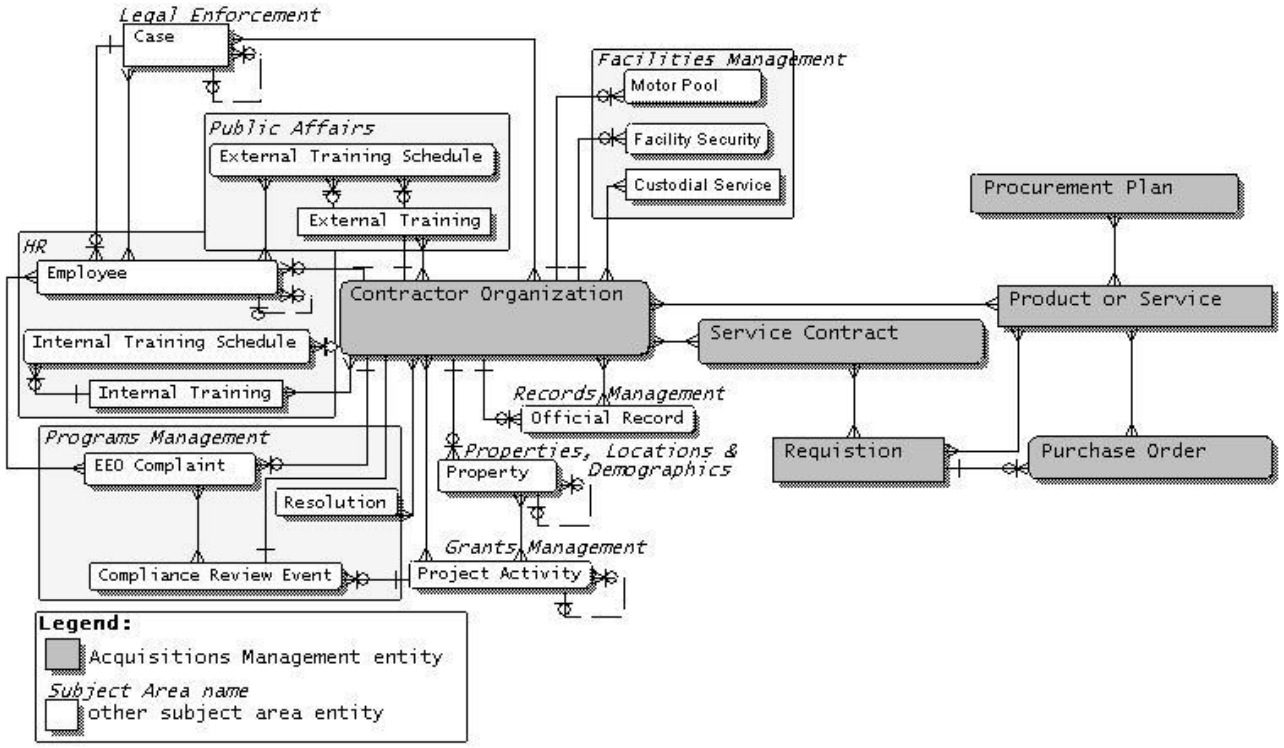
The Subject Areas are each differentiated by the data they represent. The Subject Areas are defined in detail in the sections below. For each subject area a graphic displays the entities, shown in gray, that belong to or are owned by that subject area. Other entities that are directly related to the subject area entities are shown in white, with their subject area shown above the entity. The entities that don't belong to the subject area are important to show how the subject areas relate to one another. The lines between entities represent the associations, or relationships, between

entities. Standard Information Engineering (IE) notation is used to depict relationships between entities.

7.4.3.1 Acquisitions Management Subject Area

The *Acquisitions Management* subject area, shown in Exhibit 7-4, organizes information about a contractor organization; products or services produced by a contractor, and the contract mechanisms, which allows HUD to request contractor services.

Exhibit 7-4 – Acquisitions Management Subject Area



The Acquisitions Management Subject Area consists of 6 entities.

Contractor Organization – defines a provider of services or products for compensation.

Procurement Plan – defines a detailed document, which identifies the goods and services to be obtained by a HUD Organization for a given fiscal year.

Product or Service – defines a good or ware, or an activity carried out by service providers as a result of an agreement.

Purchase Order – defines a written form requesting the purchase of tangible goods or commodities.

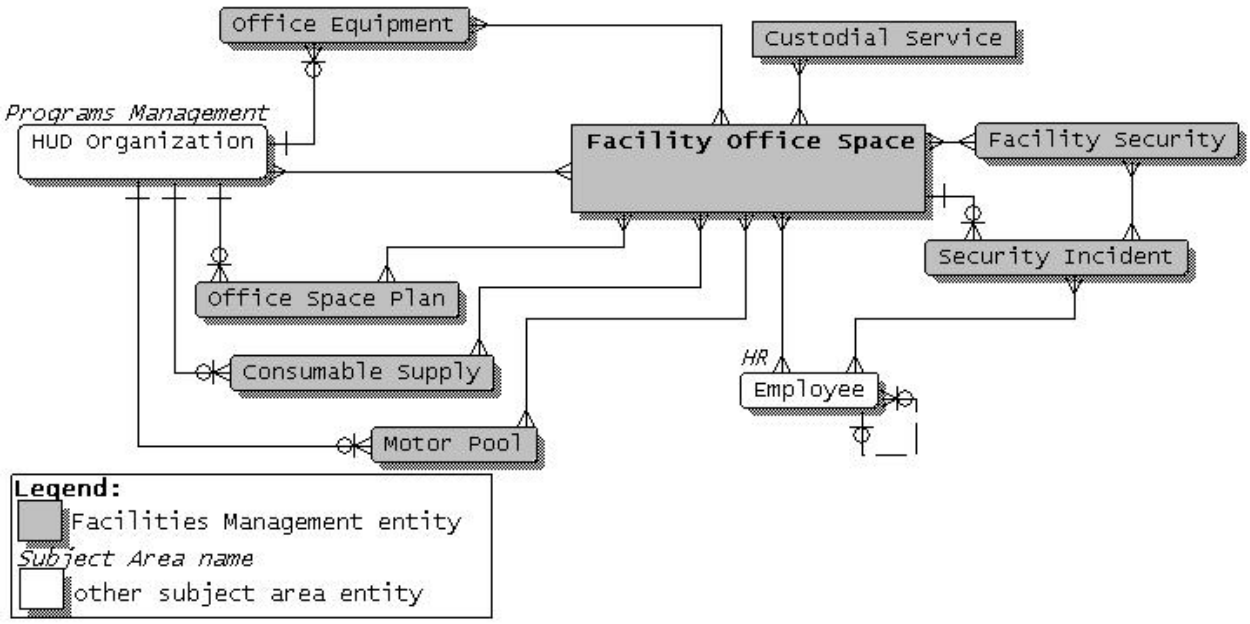
Requisition – defines an order for administrative services, supplies, products, and services to be provided for an activity or organization.

Service Contract – defines an agreement for services and/or products from a contractor in return for a payment called the contract price.

7.4.3.2 Facilities Management Subject Area

The *Facilities Management* subject area, shown in Exhibit 7-5, organizes data about the operation and maintenance of office space, equipment, and supplies needed for the purpose of conducting HUD business.

Exhibit 7-5 – Facilities Management Subject Area



The Facilities Management Subject Area consists of 8 entities.

Custodial Service – defines a service provided by contractor(s) responsible for performing necessary building and grounds services for HUD.

Consumable Supply – defines consumable materials or provisions to support operations.

Facility Office Space – defines the address of a space acquired for the purpose of conducting HUD business.

Facility Security – defines the service or equipment provided to protect a HUD facility and its inhabitants from danger, hazard, or other adverse contingencies.

Motor Pool – defines a group of motor vehicles centrally controlled by HUD and dispatched for use as needed.

Office Equipment – defines the material item required to assist in performing tasks assigned to an employee or HUD organization.

Office Space Plan – defines a floor plan of the office space that is used or has planned use by the department.

Security Incident – defines an event violates or endangers the security of HUD personnel, property or others on HUD property.

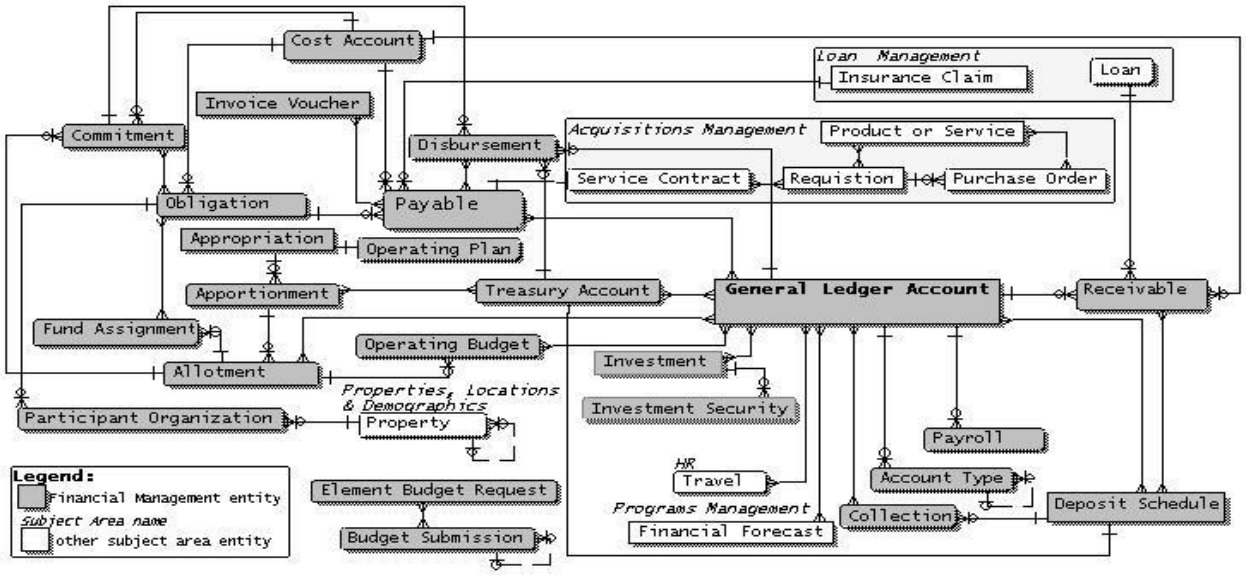
7.4.3.3 Financial Management Subject Area

The *Financial Management* subject area, shown in Exhibit 7-6, organizes information about all of HUD's financial events, including budget execution, funds allocation and control.

Further actions for the Financial Management subject area include:

- Mapping the entities into the Joint Financial Management Improvement Program (JFMIP) functions including General Ledger, Funds Management, Payment Management, Receipt Management, and Cost Management to determine if any entities are missing.
- Define nested subject areas that align with the JFMIP functions.

Exhibit 7-6 – Financial Management Subject Area



The Financial Management Subject Area consists of 24 entities.

Account Type - defines a set, group, collection, or list of categories that report obligations according to the nature of the services or articles procured.

Allotment – defines an authority delegated to incur obligations within a certain amount pursuant to an apportionment or other statutory provision.

Apportionment – defines a determination and limitation by OMB as to the amount of obligations or expenditures, which may be incurred.

Appropriation – defines an act of Congress, which provides authority to incur obligations for specified purposes and to make disbursements from the Treasury.

Budget Submission – defines a request for funding which provides the estimated dollars for a program and summary of expenditures.

Collection – defines an actual payment or monies received directly by the Department or through an authorized agent.

Commitment – defines a firm administrative reservation of funds.

Cost Account – defines the cost incurred to accomplish a purpose, to carry on an activity or operation, or to complete a unit of work or specific job.

Deposit Schedule – defines monies received by the Department of the Treasury on HUD's behalf.

Disbursement – defines the gross payment of obligations incurred.

Element Budget Request – defines a fiscal year budget that supports an element area budget requirement.

Fund Assignment – defines, for some program funds, the allocation of obligation authority to field offices.

General Ledger Account – defines a summary of all general ledger financial transactions recorded for a specific accounting event within a specific accounting period.

Investment – defines the amount of excess cash used to purchase a given Investment Security with defined terms.

Investment Security – defines the types of Investments available for purchase by Federal Agencies through the Department of the Treasury.

Invoice Voucher – defines a request for payment to a client or a provider of services or supplies to the Department.

Obligation – defines a monetary amount of orders placed, contracts awarded, services received during a given period that will require payment.

Operating Budget – defines an allowance provided to offices, subdivided by object class and by fiscal year quarter for obligations other than personal services.

Operating Plan – defines a statement of the Department's intentions for obligating funds provided in the appropriations act.

Participant Organization – defines a participating organization which has an obligation for property.

Payable – defines a debt incurred and confirmed by the delivery of goods or services.

Payroll – defines information pertaining to the determination of pay to a specific HUD employee.

Receivable – defines monies or payment due directly by the Department or through an authorized agent.

Treasury Account – defines a financial reporting unit established by Treasury to make amounts available for obligation and disbursement.

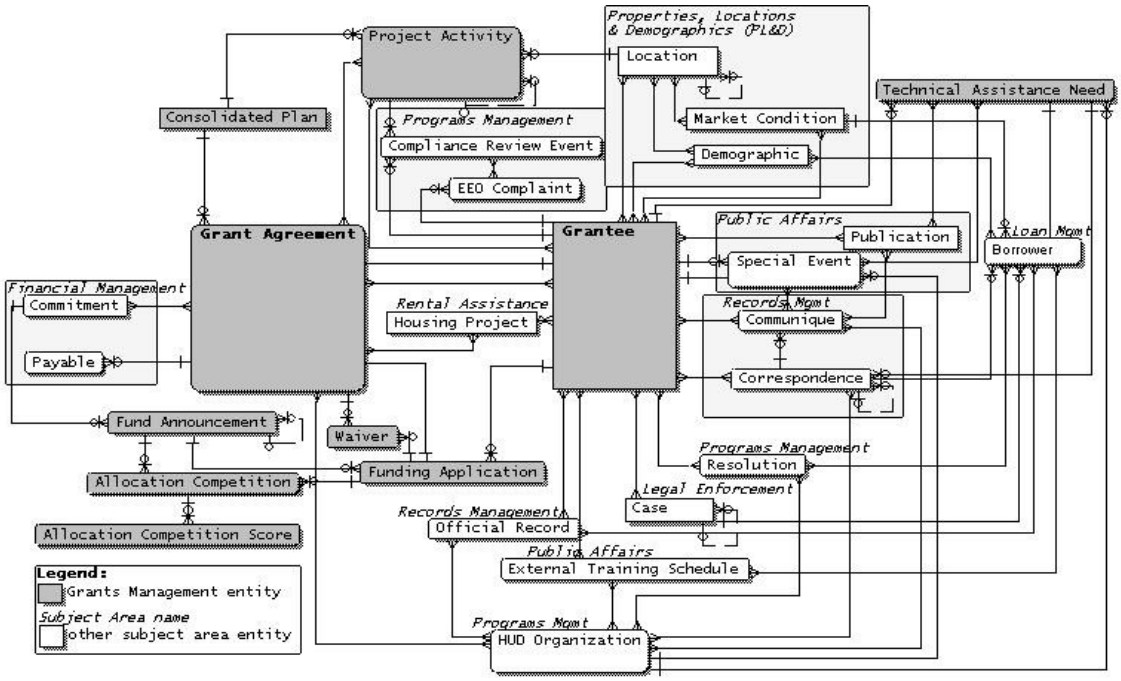
7.4.3.4 Grants Management Subject Area

The *Grants Management* subject area, shown in Exhibit 7-7, organizes information about all activities that initiate a grant for financial assistance and allow a grantee to draw funds.

Further actions for the Grants Management subject area include:

- Perform analysis to determine if the entire grants lifecycle is covered in this subject area.

Exhibit 7-7 – Grants Management Subject Area



The Grants Management Subject Area consists of 10 entities, which include:

Allocation Competition – defines an annual program allocation that may be distributed to Grantees through a number of competitions or entitlement formula allocations.

Allocation Competition Score – defines the scores for an Allocation Competition related to the Funding Application competed for.

Consolidated Plan – defines a strategy developed by local jurisdictions that combine the planning and submission requirements for the several HUD formula-based Programs.

Fund Announcement – defines public announcement by HUD that funds are available.

Funding Application – defines a formal request by a jurisdiction, state, non-profit agency, consortium or other entity for a Grant.

Grant Agreement – defines a contract between the Department and the grantee that authorizes the grantee to use appropriated HUD funds.

Grantee – defines any organization that receives funds by HUD to carry out a specific project or program and interacts with HUD in order to accomplish HUD's objectives.

Project Activity – defines a project service in which grants are provided for community activities under programs.

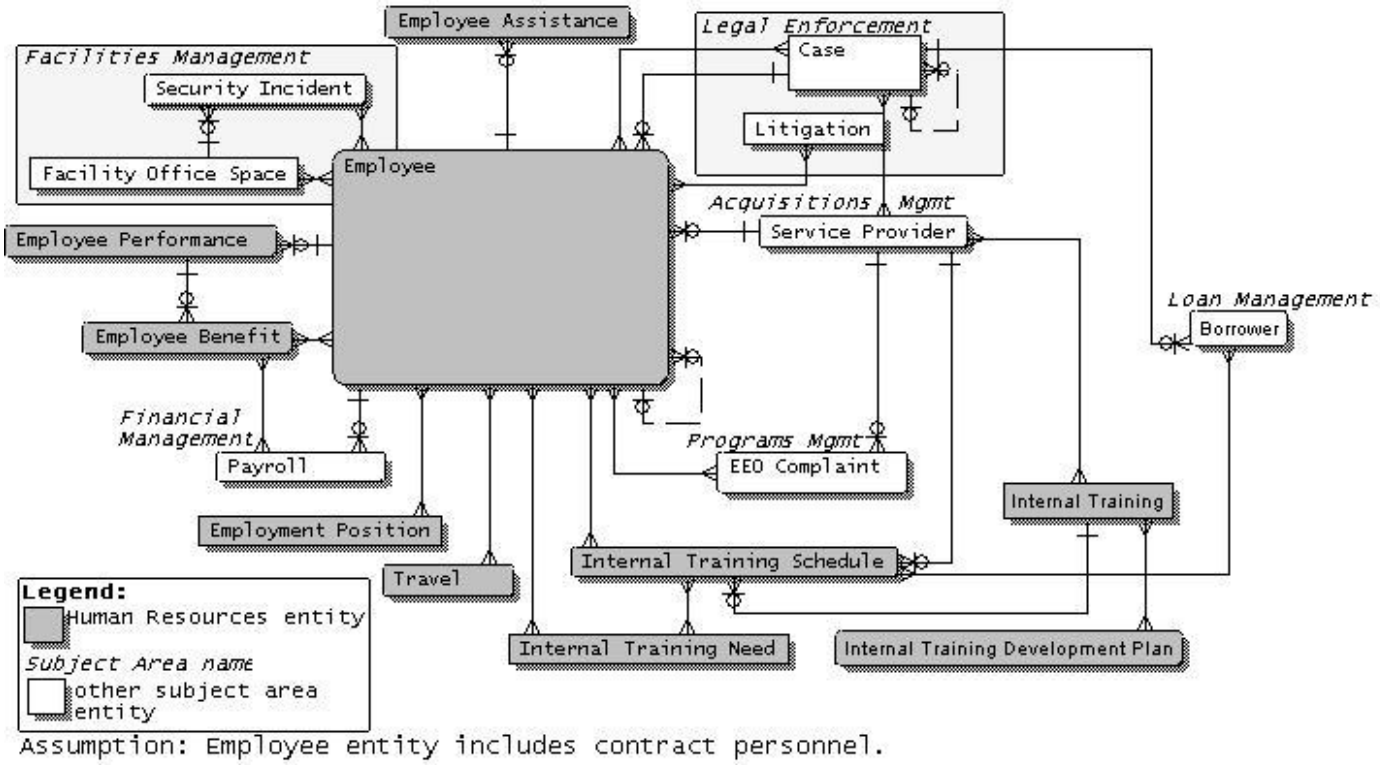
Technical Assistance Need – defines a type of training, counseling, or other type of assistance needed by program recipients/participants in order to educate them in the guidelines and procedures of HUD programs.

Waiver – defines an intentional relinquishing of provisions of a requirement or Regulation.

7.4.3.5 Human Resources Subject Area

The *Human Resources* subject area, shown in Exhibit 7-8, organizes information about the HUD work force including hiring, compensating, managing, training, and terminating employees.

Exhibit 7-8 – Human Resources Subject Area



The Human Resources Subject Area consists of 10 entities.

Employee – defines the identification and designation of a person available to perform assigned tasks at HUD is compensated by the Department either directly or via a contracting firm.

Employee Assistance – defines all programs HUD provides to employees.

Employee Benefit – defines the payments or entitlements received by an employee in return for the work performed as stipulated in an employment agreement.

Employee Performance – defines an overall evaluation of an employee's work based on the completion and quality of assigned tasks and responsibilities during a specific period of time.

Employee Position – defines a post of employment for which an employee is classified by the organization or is a temporary detail.

Internal Training – defines the instruction provided for career development, cultural diversity, and skill enhancement for internal HUD employees.

Internal Training Development Plan – defines a detailed plan identifying training courses and other materials to be developed and executed based on training needs for Internal Training.

Internal Training Need – defines an individual development plan, which articulates educational requirement or need by personnel for HUD employees.

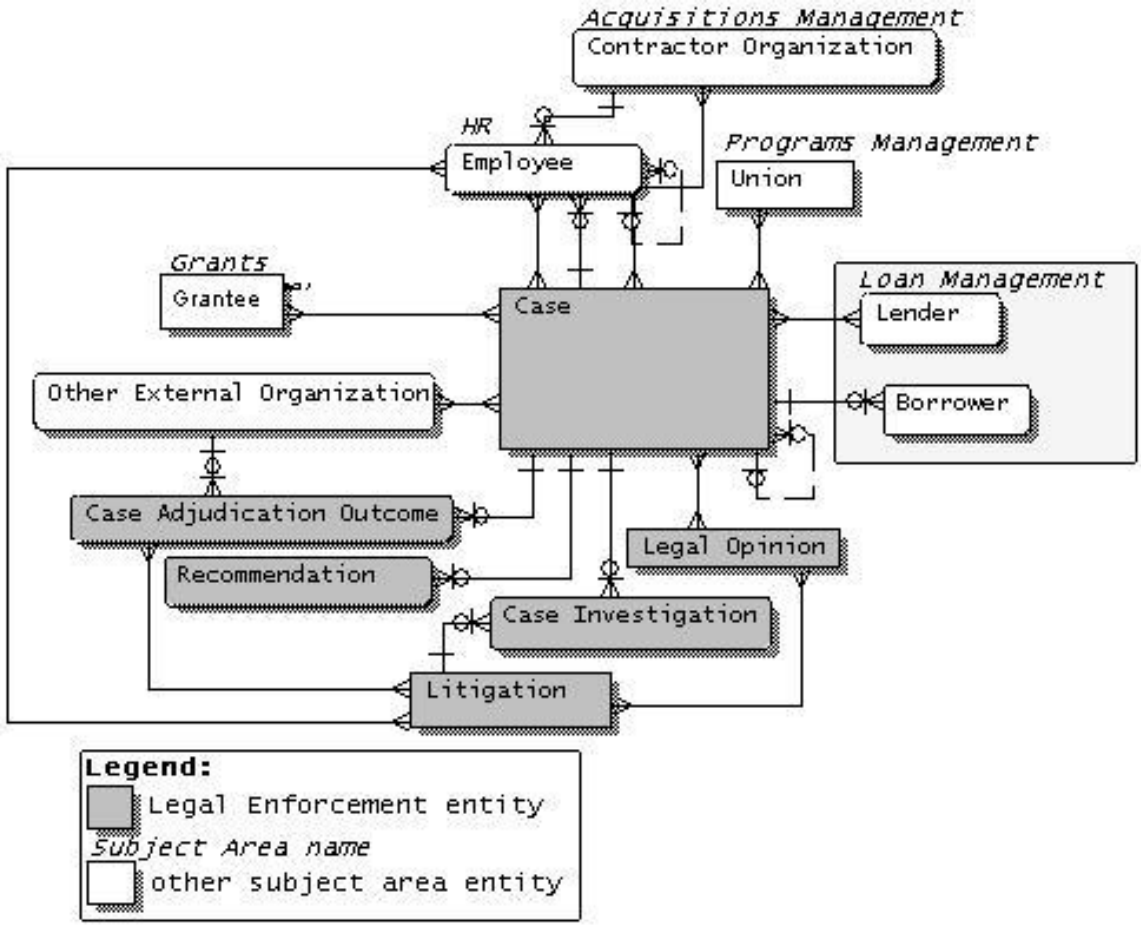
Internal Training Schedule – defines a listing of courses which details dates and times the course is to be conducted, facility, and instructor for Internal Training only.

Travel – defines all data pertaining to travel needs and requirements that result from a trip to further the mission, goals, and objectives of the Department.

7.4.3.6 Legal Enforcement Subject Area

The *Legal Enforcement* subject area, shown in Exhibit 7-9, organizes data about legal cases against those who violate HUD program requirements.

Exhibit 7-9 – Legal Enforcement Subject Area



The Legal Enforcement Subject Area consists of 6 entities.

Case – defines a collection of information including complainant, respondent, property searches, jurisdiction, investigation report, result of the investigation and decision.

Case Adjudication Outcome – defines the results of case adjudication for both civil court and criminal rulings.

Case Investigation – defines the result of performing a full analysis of a complaint again HUD, HUD program participants, or HUD employees.

Legal Opinion – defines a belief, inference or conclusion regarding a legal matter that pertains to an existing litigation or case.

Litigation – defines an event in the judicial process that carries on a legal contest.

Recommendation – defines an action to be taken to correct a material weakness, system deficiency, and/or areas of non-compliance based on findings of a review or investigations.

7.4.3.7 Loan Management Subject Area

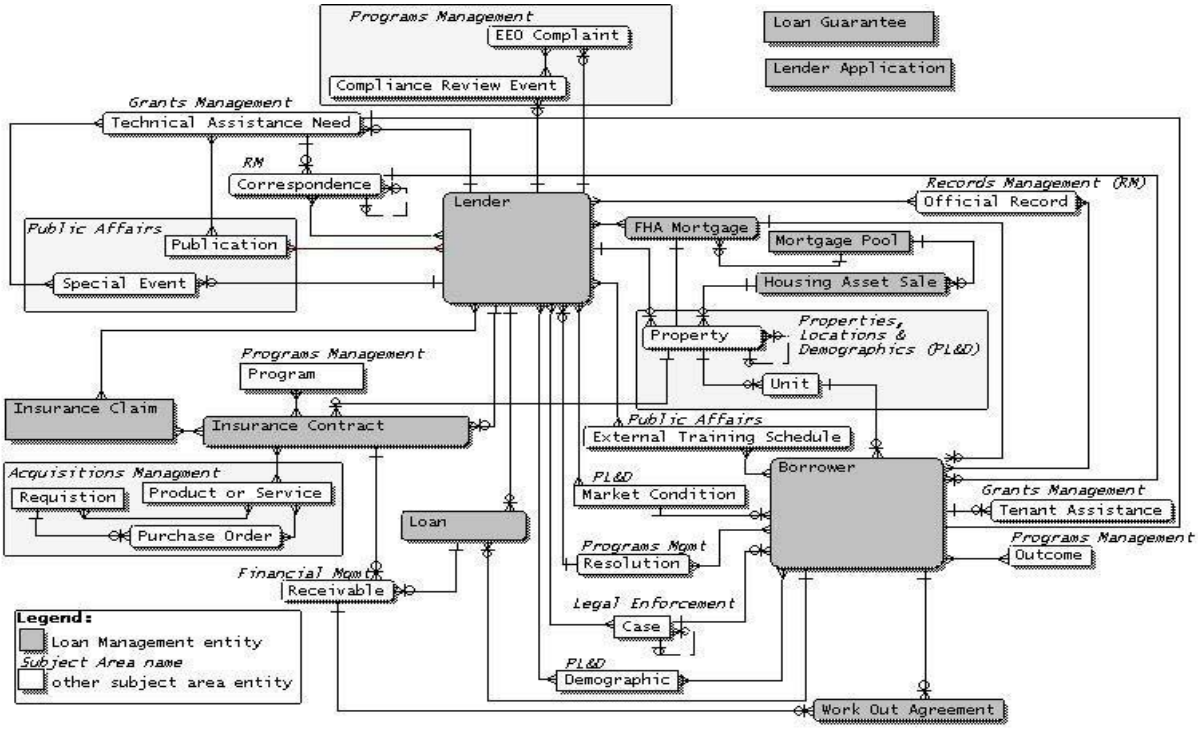
The *Loan Management* subject area, shown in Exhibit 7-10, organizes data about activities in administering and overseeing HUD's housing insurance and direct loan programs.

Further actions for the Loan Management subject area include:

- Define relationships for the Loan Guarantee and Lender application entities.

During a DCB validation session when validating the Loan Management subject area, a new subject area was proposed named Secondary Mortgage Market. This proposed subject area needs to be analyzed further to determine if it is appropriate. The proposed Secondary Mortgage Market subject area might include the following entities: Mortgage Backed Security, FHA Mortgage, Mortgage Pool, GNMA, OFHEO, Fanny Mae, and Freddie Mac. Mapping for this subject area might include: Natural Business System: Insurance; Business Reference Model: Loan Insurance; and, Steward: GNMA.

Exhibit 7-10 – Loan Management Subject Area



The Loan Management Subject Area consists of 11 entities.

Borrower – defines an individual who is the borrower of funds through a mortgage insured by HUD.

FHA Mortgage – defines a formal instrument, which creates a lien on the property used as security to ensure repayment of the debt owed on that property.

Housing Asset Sale – defines an exchange of HUD-held notes or HUD-owned property for cash or a mortgage note.

Insurance Claim – defines a request for payment by the lender resulting from an insurance claim for a mortgage or loan.

Insurance Contract – defines a contract between HUD and the mortgagee setting forth agreements and certifications by the mortgagee concerning certain HUD requirements after insurance.

Lender – defines the HUD-approved business enterprise that provides a mortgage under an FHA insurance program.

Lender Application – defines an application for establishment as a partner, containing the potential partners' qualifications to demonstrate their existing and potential capability and capability to carry out programs.

Loan – defines the lending of money to a borrower where a mortgage of the property is not involved.

Loan Guarantee – defines a program by which HUD guarantees a portion of a lender's loan to a home owner against default.

Mortgage Pool – defines a collection of mortgages of similar nature, which are sold as a unit in the secondary market or used to back a security, which is then sold in the capital markets.

Work Out Agreement – defines an agreement between a home buyer and lender to make mortgage payments on a schedule which the home buyer is able to accommodate.

7.4.3.8 Program Management Subject Area

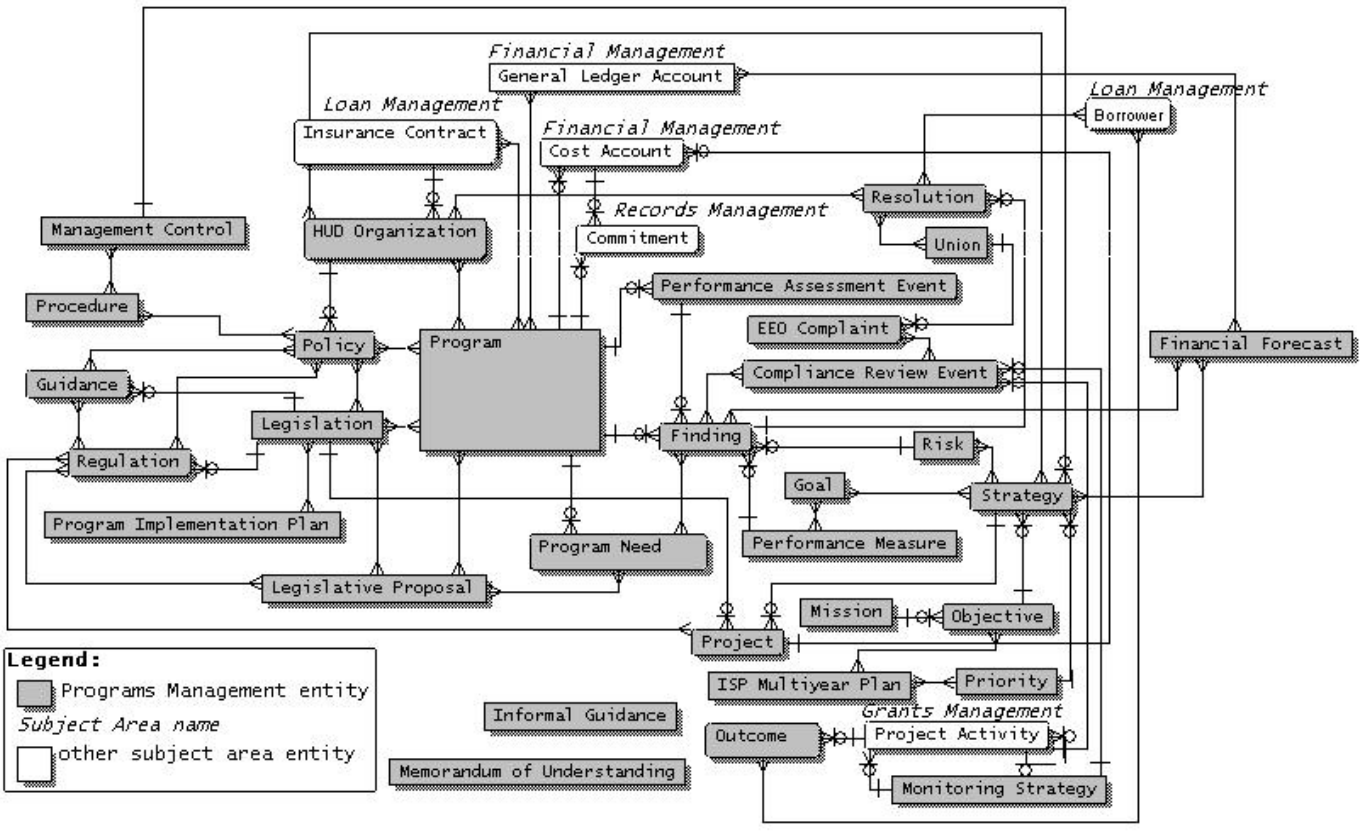
The *Program Management* subject area, shown in Exhibit 7-11, organizes information about identifying program needs, defining and refining programs, assessing how well each program or product is meeting its mission and objectives, and resolving those issues that cross program lines and need resolution at higher levels. This includes developing the strategic direction, defining performance measures, and monitoring the overall performance of the Department.

Further actions for the Program Management subject area include:

- Perform further decomposition with the goal of reducing the complexity of this subject area. Potentially divide into multiple subject areas or nested subject areas.
- This subject area has not been validated with the Data Control Board. Perform validation for this subject area with the Data Control Board.
- Understand the Goal entity, which seems to be generalized, in the context of this subject area.

- Confirm that the ISP Multiyear Plan entity belongs in this subject area.

Exhibit 7-11 – Program Management Subject Area



The Programs Subject Area consists of 31 entities.

Compliance Review Event – defines an examination, audit, periodic evaluation, site visit, or other review conducted to ensure policy, regulations, standards, or procedures are adhered to.

EEO Complaint – defines a formal charge or accusation submitted by an employee or partner as a result of violation(s) of rules and regulations set forth by the Equal Employment Opportunity Commission.

Finding – defines a positive or negative finding identified by a review, assessment, audit, or investigation.

Financial Forecast – defines an estimate of Department and programs: expenditures, rate of claims, claim premium recoveries, future income, income-stream, cash flow, rate of prepayment, and dividend.

Goal – defines a milestone identified to measure whether the Objective is being accomplished.

Guidance – defines directions, advice or a formal written collection of instructions from external agencies, which provides interpretations of statutory or regulatory requirements.

HUD Organization – defines the Department's defined structure.

Informal Guidance – defines informal provision of advice and guidance to impart skills, knowledge, and/or capability to a person or group of persons.

ISP Multiyear Plan – defines the Departmental 5 year strategic plan for managing HUD's investment portfolio.

Legislation – defines the statute or law established by Congress or other governing bodies.

Legislative Proposal – defines a recommendation for new or changed legislation, regulation or program guidance, based upon program need(s).

Management Control – defines measures used to (1) safeguard assets from fraud, waste, and mismanagement; (2) promote accuracy and reliability in accounting records; (3) encourage and measure compliance with Departmental policies; and (4) evaluate the efficiency of operations.

Memorandum of Understanding – defines an informal contract signed by 2 or more parties that jointly binds them in carrying out a program or providing a service.

Mission – defines a clear, concise statement of the Departments' reason for being, based on statute.

Monitoring Strategy – defines a targeted plan of action for reviewing the effectiveness of the operations of an organization or program.

Objective – defines a broad, longer-term measurable result that HUD wants to achieve to support its mission, which is integral to policy of the Department.

Outcome – defines the end result arising as an effect of a Program, Housing Project, Grantee or Partner.

Performance Assessment Event – defines the event of an appraisal or measurement of Department performance, program development, implementation and operation.

Performance Measure – defines an indicator used to gauge the success or progress in the accomplishment of a Strategy or Goal.

Policy – defines a documented plan or course of action designed to influence and determine Departmental decisions and operations.

Priority – defines a specific action that requires immediate attention as directed by management.

Procedure – defines an approach or method defining how work processes should be performed in the HUD Organization or by HUD personnel.

Program – defines the outline plan of action statutorily mandated by Congress to accomplish objectives of HUD and Congress such as providing decent, safe and sanitary housing.

Program Implementation Plan – defines a design for allocation of resources (dollars or staff) by dates and events.

Program Need – defines an identified issue, problem or condition requiring modification to an existing program or recommendation for a new program within the scope of HUD operations and its mission.

Project – defines an effort focused on a specific, finite accomplishment, which could become a temporary HUD organization.

Regulation – defines a principle or rule, describing procedures to be followed and or constraints, which govern Federal Agency(s) and affiliated Organizations.

Resolution – defines a response to a Finding, and is a corrective action conducted which may include sanctions, procedural changes, program

recoveries and efficiencies expressed by date, program, dollars, and type of action.

Risk – defines a potential loss due to fraud, waste, and mismanagement of resources.

Strategy – defines a means of achieving a Goal or Objective.

Union – defines a confederation of independent individuals united for a common purpose.

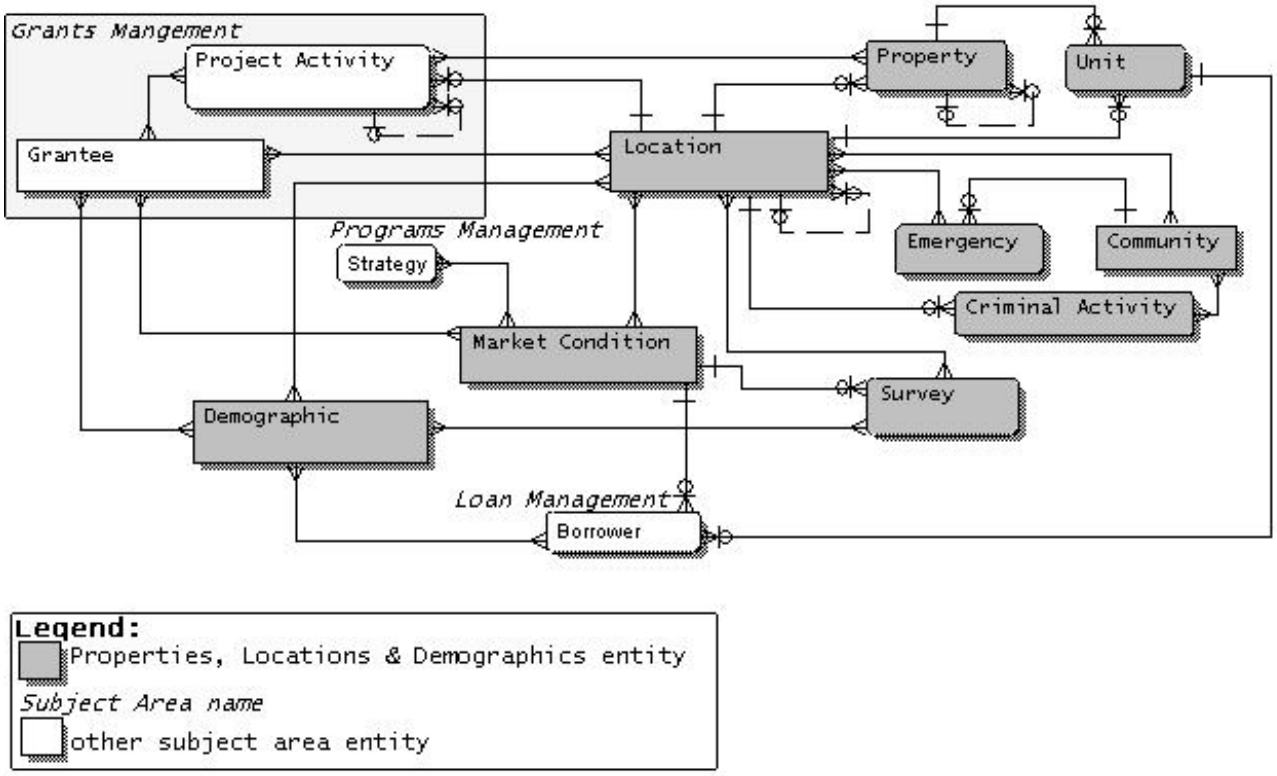
7.4.3.9 Properties, Locations & Demographics Subject Area

The *Properties, Locations & Demographics* subject area, shown in Exhibit 7-12 organizes data about analysis and interpretation of economic and housing related subjects.

Further actions for the Properties, Locations & Demographics subject area include:

- Perform further analysis to determine if all data belonging in this subject area is represented.
- Determine if the Community, Criminal Activity, and Emergency entities are still of interest to HUD.

Exhibit 7-12 – Properties, Locations & Demographics Subject Area



The Properties, Locations & Demographics Subject Area consists of 9 entities.

Community – defines an interacting population of diverse individuals living in a common area or location.

Criminal Activity – defines an act that is forbidden by public law, or a behavior or situation that appears to be undesirable and could be a sign of criminal activity.

Demographic – defines a periodic enumeration of a population.

Emergency – defines information about a situation or condition requiring immediate response in providing housing assistance.

Location – defines a finite geographical area for the identification of a particular dwelling or a customer's whereabouts.

Market Condition – defines an external factor that has an impact on HUD business operations.

Property – defines an identifiable parcel of real estate, including both land and buildings.

Survey – defines a collected original data on housing related subject, economic affairs, and other related subject and issues.

Unit – defines a dwelling intended for occupancy by low-income or very low-income households.

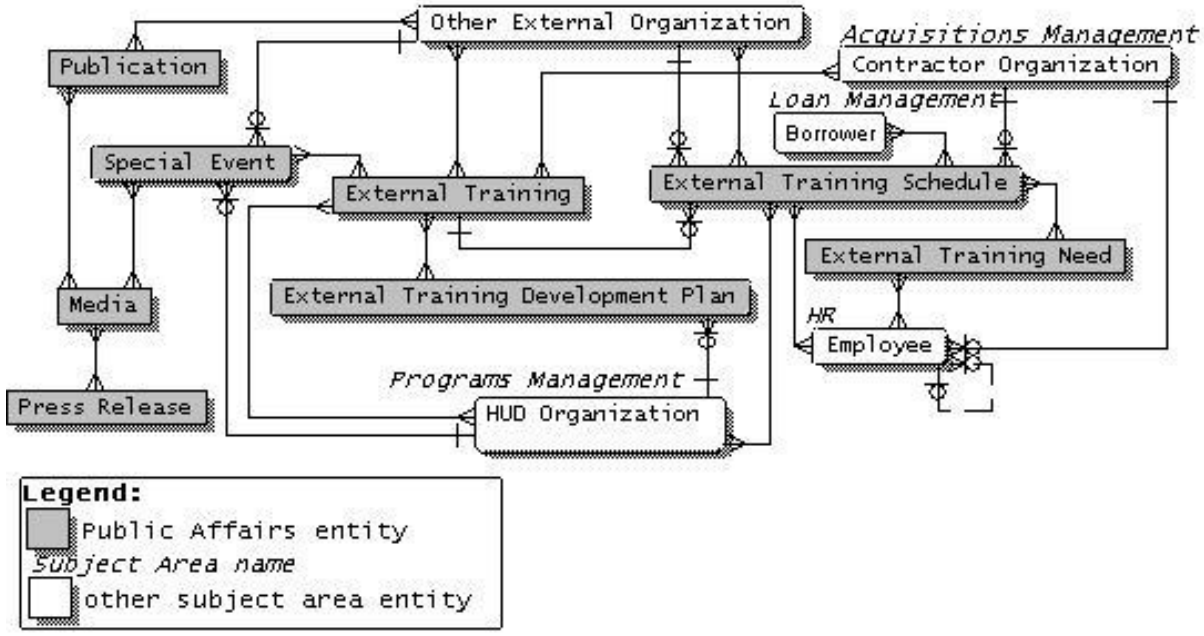
7.4.3.10 Public Affairs Subject Area

The *Public Affairs* subject area, shown in Exhibit 7-13, organizes data about planning and management activities related to communicating with the public.

Further actions for the Public Affairs subject area include:

- Perform further analysis to determine if all data belonging in this subject area is represented.
- Determine if this subject area needs to represent mailing lists and neighborhood network.

Exhibit 7-13 – Public Affairs Subject Area



The Public Affairs Subject Area consists of 8 entities.

External Training – defines the instruction provided for career development, cultural diversity, and skill enhancement for the public.

External Training Development Plan – defines a detailed plan identifying training courses and other materials to be developed and executed based on training needs for External Training.

External Training Need – defines an individual development plan, which articulates educational requirement or need by personnel for the public.

External Training Schedule – defines a listing of courses which details dates and times the course is to be conducted, facility, and instructor for External Training only.

Media – defines a specific entity, which HUD uses to communicate with the public.

Press Release – defines a public statement regarding important key activities and successes performed by HUD and released through the media.

Publication – defines the Department literature, which is produced and issued to all interested Organizations.

Special Event – defines an event that is held by HUD or participated in by HUD in order to communicate and advertise program successes and achievements.

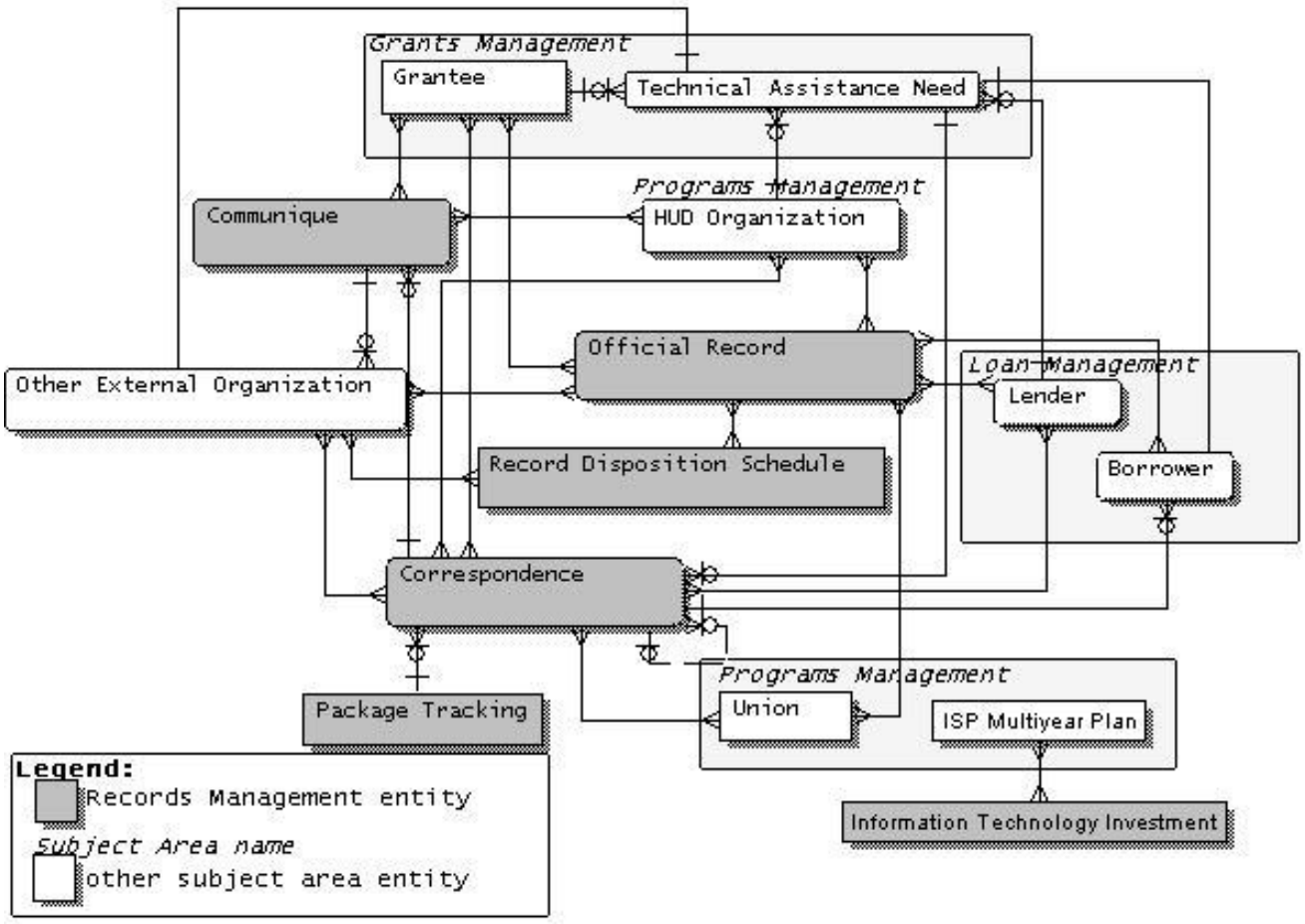
7.4.3.11 Records Management Subject Area

The *Records Management* subject area, shown in Exhibit 7-13, organizes data about HUD's information resources including: data warehouses, documents, communications, and official records.

Further actions for the Records Management subject area include:

- Information Management is inadequately modeled. Define the entities that describe Information Management at HUD.

Exhibit 7-14 – Records Management Subject Area



The Records Management Subject Area consists of 6 entities.

Communiqué – defines an expression of ideas or concepts for the purpose of informing the public about HUD program offerings, current status and initiatives.

Correspondence – defines a written electronic, verbal or other form of internal and external information, inquiry, or response.

Information Technology Investment – defines a project or purchase which enables information technology support to the business of HUD.

Official Record – defines documents and electronic mail transmissions generated as a result of HUD business activities.

Package Tracking – defines the tracking of letters or packages that are transported to or from the Department.

Record Disposition Schedule – defines a timetable that details the retention and purging schedules for HUD records.

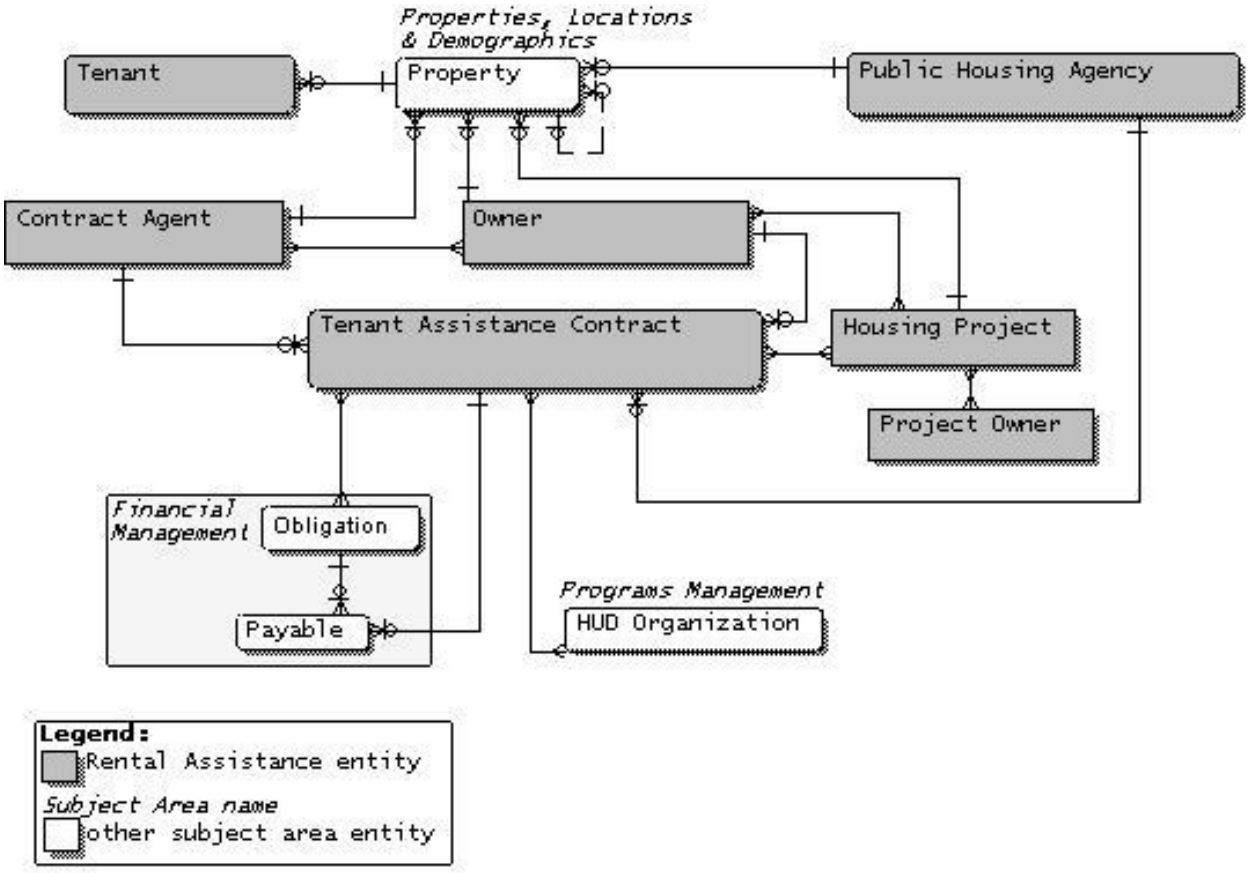
7.4.3.12 Rental Assistance Subject Area

The *Rental Assistance* subject area, shown in Exhibit 7-15, organizes data about all activities that initiate a contract for rental assistance and allow a tenant to receive assistance.

Further actions for the Rental Assistance subject area include:

- The Data Control Board has not validated this subject area. Perform validation of the Rental Assistance subject area with the Data Control Board.
- Perform further validation with the Rental Housing Assistance Business Process Improvement Reengineering Project.

Exhibit 7-15 – Rental Assistance Subject Area



The Rental Assistance Subject Area consists of 7 entities.

Contract Agent – defines an entity that negotiates a tenant contract.

Housing Project – defines a physical dwelling or scattered site consisting of multiple housing units intended for low-income customers.

Owner – defines a person who has the legal title to a property.

Project Owner – defines the business enterprise that owns a housing project, which consists of one or more housing units intended for low-income customers.

Public Housing Agency – defines the organization, which manages the housing for low-income residents at rents they can afford.

Tenant – defines a person that pays rent to use or occupy a property owned by another person.

Tenant Assistance Contract – defines a certificate or voucher that is provided to the tenant to be used toward rent.

7.5 DATA OPPORTUNITIES ANALYSIS

Several known limitations exist with the Data Reference Model (DRM) and are identified here to facilitate the iterative process of making future refinements to the DRM.

The DRM data categorization layer should be solidified, prior to work commencing on the other DRM layers, by performing the following next steps:

- Complete actions defined for each Subject Area: A number of actions are identified for each subject area in the *Subject Area Details* section. Once these actions have been completed, the subject area should be revalidated with the Data Control Board.

- Resolve the many-to-many relationships between entities: Across all subject areas, the many-to-many relationships between entities remain unresolved. The many-to-many relationship should be replaced with an *association entity* and then the two original entities should be related to the association entity.

- Decompose Other External Organization central entity: The Other External Organization entity is not owned by any subject area, because it is generalized and the entity could not belong to just one subject area. The analyst team proposes identifying new entities that represent the external organizations used at HUD. Examining the relationships from this central entity to related entities can identify new entities. Some possible new entities might include: House and Senate committees, OMB, DOJ, FBI, DOL, Public Interest Groups, universities, housing authorities, resident management groups, FHA

lenders, homebuyers, and renters. Appendix M displays the Other External Organization entity and its relationships.

Once the data categorization layer is refined, the data exchange layer and data structure layer must be defined. The definition of these layers is the responsibility of segment architecture development teams.

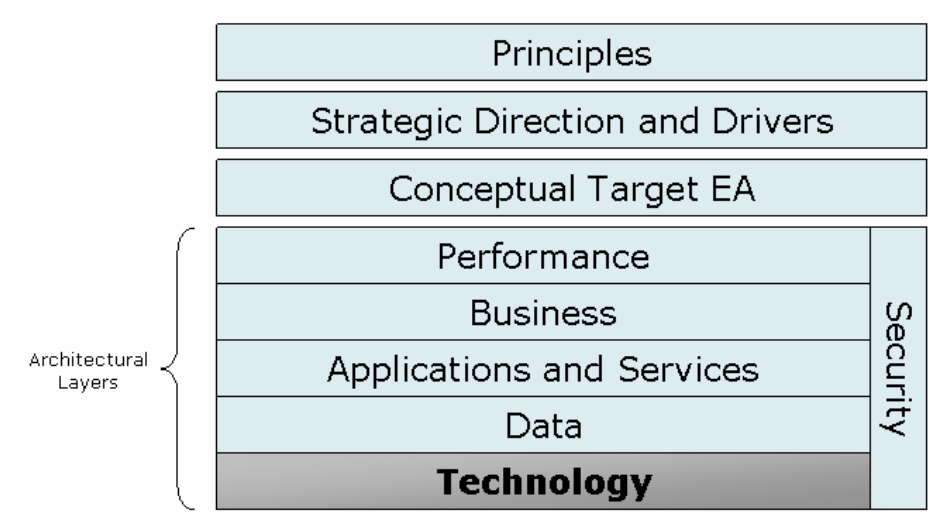
8 TECHNOLOGY LAYER

8.1 INTRODUCTION

HUD's target Technology Layer defines the technology elements that collectively support the adoption and implementation of a service-oriented, component-based architecture. It provides a foundation to describe the standards, specifications, technologies and products that support the secure delivery, exchange, and construction of business and service components.

The concept of technology supporting a service component defines the relationship between the SRM and the TRM. The model advances the re-use of technology and component services across HUD through technology standardization and modernization. Aligning HUD's capital investments to the TRM leverages a common, standardized vocabulary, allowing discovery, collaboration, and interoperability of IT assets and investments. HUD will benefit by identifying and re-using the best solutions and technologies to support its business functions, mission, and target architecture. Exhibit 8-1 shows how the Technology layer fits into the overall HUD Target EA framework.

Exhibit 8-1 –Target EA Framework: Technology



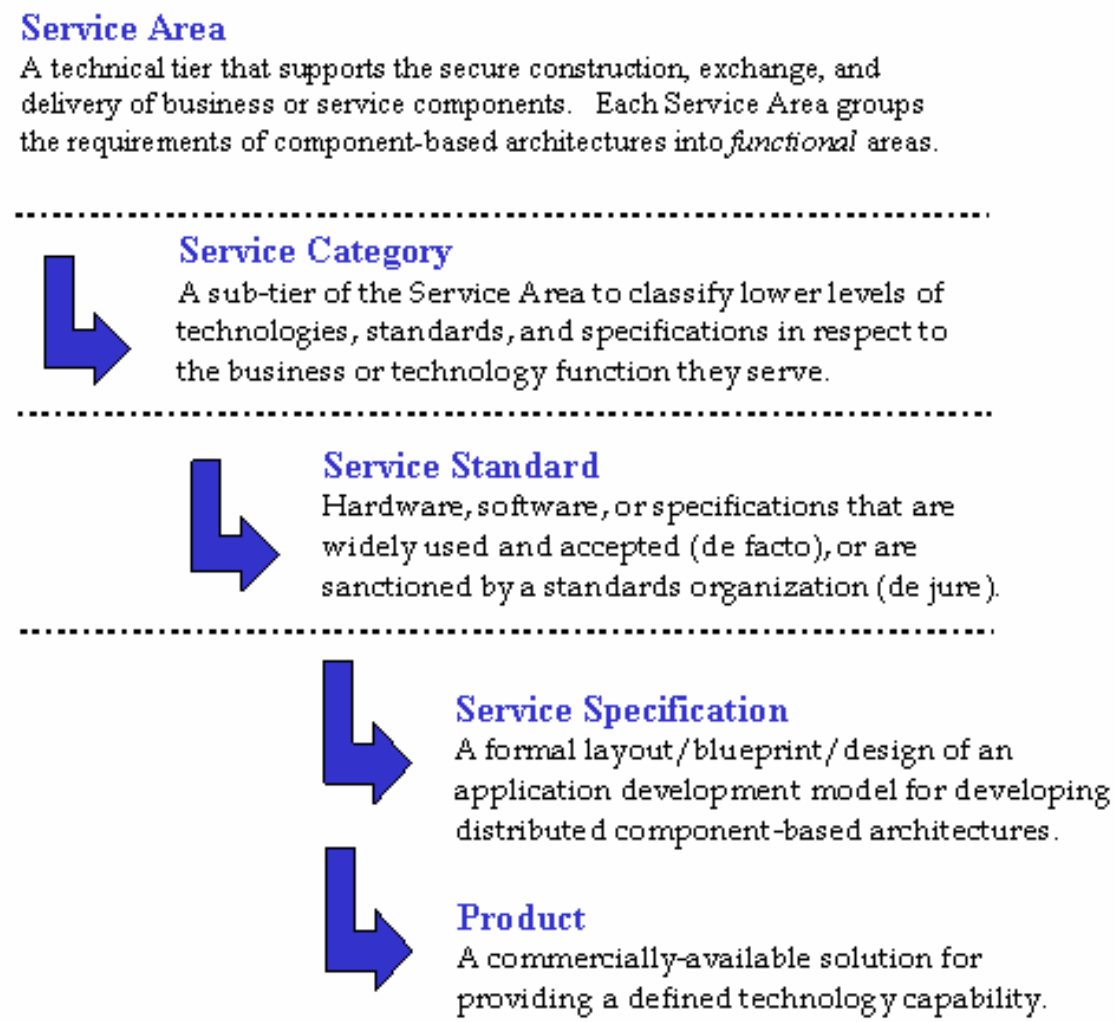
The Technology layer is intended to:

- Define technology standards, specifications, and recommendations that are industry-proven
- Focus technology standards, specifications, and recommendations on those that embrace the Internet and related approaches
- Create a foundation that focuses heavily on the secure delivery and construction of Service Components and their interfaces
- Identify the layers of a Component-Based Architecture and the supporting technologies

8.2 HUD TECHNICAL REFERENCE MODEL HIERARCHY

HUD's TRM is a taxonomy for describing the standards, specifications and products that support the secure delivery of business (or service) components. Exhibit 8-2 depicts the hierarchical structure of the HUD TRM.

Exhibit 8-2 –HUD Technical Reference Model Hierarchy



Derived directly from the FEA TRM, HUD's TRM consists of a five layer hierarchy: Service Areas, Service Categories, Service Standards, Service Specifications and Products. Service Areas contain multiple Service Categories, and Service Categories contain multiple Service Standards. In addition, HUD's TRM contains two additional layers – the Service Specification and Product layers. These layers exist logically at the same level, under Service Standard.

The two additional layers in HUD's TRM are in place to take the technology model from a level of abstraction, categorized through the first three layers of the model to specific products and specifications that are prescriptive in

nature. In other words, the model's Product and Service Specification layers define the actual technology that is used. The Service Specification and Product layers of the TRM serve as the main focus area for decision-making as it pertains to technology and the reuse or development of service components.

8.3 HUD TECHNICAL REFERENCE MODEL OVERVIEW

At the highest level of the taxonomy, the HUD TRM consists of four service areas, shown in Exhibit 8-3, HUD Technical Reference Model. The definition for each of the four service areas is as follows:

- **Service Access and Delivery** – refers to the collection of standards and specifications to support external access, exchange, and delivery of Service Components or capabilities. This area also includes the Legislative and Regulatory requirements governing the access and usage of the specific Service Component.

- **Service Platform and Infrastructure** – refers to the collection of delivery and support platforms, infrastructure capabilities and hardware requirements to support the construction, maintenance, and availability of a Service Component or capabilities.

- **Component Framework** – refers to the underlying foundation, technologies, standards, and specifications by which Service Components are built, exchanged, and deployed across Component-Based, Distributed, or Service-Orientated Architectures.

- **Service Interface and Integration** – refers to the collection of technologies, methodologies, standards, and specifications that govern how agencies will interface (both internally and externally) with a Service Component. This area also defines the methods by which components will interface and integrate with back office / legacy assets.

Exhibit 8-3 – HUD Technical Reference Model

Service Access and Delivery	
Access Channels Service Requirements	Delivery Channels Service Transport
Service Platform and Infrastructure	
Support Platforms Delivery Servers Hardware / Infrastructure	Database / Storage Software Engineering
Component Framework	
Security Presentation / Interface Data Management	Data Interchange Business Logic
Service Interface and Integration	
Integration Interface	Interoperability

8.4 RELATIONSHIP TO THE FEDERAL ENTERPRISE ARCHITECTURE TRM

The structure of the HUD TRM is derived directly from the FEA TRM (Exhibit 8-4). In addition, the actual content and definitions in the top three layers of the hierarchy (Service Area, Service Category and Service Standard) are derived directly from the FEA TRM. However, the Service Specification and Product layers in HUD's TRM are populated with the technologies that are appropriate for HUD. Some of these technologies are encompassed within the FEA TRM, while others are not.

Exhibit 8-4 – FEA TRM

8.5 HUD TECHNICAL REFERENCE MODEL DETAILS

This section, organized by service category and service standard, summarizes the current technologies (service specifications and products) in use within HUD and the technologies recommended to support the target environment. The data for both current and target are limited. The current service specifications and products were derived from a system-level analysis based on information in the Inventory of Automated Systems (IAS)

and baseline information in the Enterprise Architecture Management System (EAMS). As the new HUD Information Technology Services (HITS) contract, which is responsible for all Departmental infrastructure, establishes the infrastructure baseline for the Department, that data will enable a much more robust articulation of the baseline technology layer within future versions of the Target EA.

Likewise, the target technology layer is only currently populated with a limited subset of the technologies that may be needed to support HUD's target environment. This limitation is due primarily to three factors:

- Limited time and resource availability to define the target technologies that are most suitable for HUD.
- Lack of appropriate governance structures for vetting and approving a new set of service specifications and products and sunsetting specifications and products that do not support the target environment.
- Delayed HITS contract resolution.

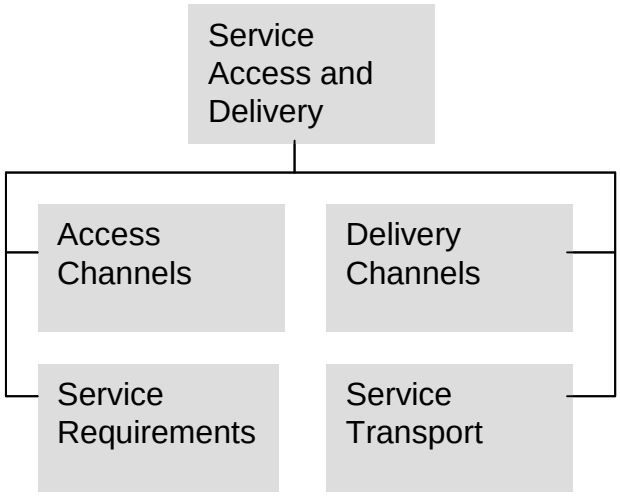
The need to establish a more robust set of target service specifications and products, and to create the needed governance, is given a high priority in the Department's EA Transition Plan. The resolution of the HITS contract will now allow for greater coordination with the HITS team to better understand their plans for migrating toward new technologies in the infrastructure.

A detailed breakdown of the current and target products and service specifications by service standard is provided in the sections that follow. The target service specifications and products are summarized in a single table in Appendix J, HUD Target Standards Profile.

8.5.1 Service Access and Delivery

Service Access and Delivery - refers to the collection of standards and specifications to support external access, exchange, and delivery of Service Components or capabilities. This area also includes the Legislative and Regulatory requirements governing the access and usage of the specific Service Component.

Exhibit 8-5 – Service Access and Delivery



8.5.1.1 Access Channels

Access Channels - define the interface between an application and its users, whether it is a browser, personal digital assistant or other medium.

- Web Browser – Define the program that serves as your front end to the World Wide Web on the Internet. In order to view a site, you type its address (URL) into the browser's location field.
- Wireless / PDA - Define the technologies that use transmission via the airwaves. Personal Digital Assistant (PDA) is a handheld computer that serves as an organizer for personal information. It generally includes at least a name and address database, to-do list and note taker.
- Collaboration Communications – Define the forms of electronic exchange of messages, documents, or other information. Electronic communication provides efficiency through expedited time-of-delivery.
- Other Electronic Channels – Define the other various mediums of information exchange and interface between a user and an application.

The table below describes the key specifications and products within the Access Channels Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Web Browser	Internet Explorer 6.0 Netscape 4.79 Internet Explorer* Netscape Communicator Microsoft Internet Explorer 4.0 or Earlier Netscape Communicator 4.7* / Navigator 4.04*	N/A	Internet Explorer 6.01 Netscape Communicator 7.0	N/A
Wireless/ PDA	Palm Pilot Blackberry PocketPC*	N/A	Blackberry PocketPC	N/A
Comm/ Collaboration	Brightmail Anti-SPAM Enterprise Edition v6 Lotus iNotes v5.0.7 Lotus Notes v5.0.X Microlog Envox* Microlog TIVRA* DEC 3400, VCS 3500 pc Anywhere 32* Lotus Notes 4.52/Domino* Lotus Notes 5.0*	N/A	Lotus Notes/Domino Mail 6.5 Lotus SMTP Gateway	Email Fax Kiosk Fax Gateway
Other Electronic Channels	N/A Gentran COTS Package*	Electronic Data Interchange (X.12)	N/A	Extensible Markup Language (XML)

*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that HUD upgrade both of its web browsers. The Internet Explorer and Netscape Communicator browsers should be upgraded to the latest versions, 6.01 and 7.0, respectively. Blackberry and PocketPC are existing products at HUD and should remain so as the standard for hand held devices. HUD should continue to use Lotus Notes/Domino as the standard for email communication. Other access channels for communication and collaboration include the use of fax, kiosk and fax gateway specifications. It is recommended that HUD begin to use XML as an alternative to Electronic Data Interchange (EDI), as EDI is an outdated specification for effectively exchanging data.

8.5.1.2 Delivery Channels

Delivery Channels - define the level of access to applications and systems based upon the type of network used to deliver them.

- Internet - The Internet is a worldwide system of computer networks in which users at any one computer can, if they have permission, get information from any other computer.
- Intranet - An Intranet is a private network that is contained within an enterprise. It may consist of many inter-linked local area networks and is used to share company information and resources among employees.
- Extranet - An Extranet is a private network that uses the Internet protocol and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses. An extranet can be viewed as part of a company's intranet that is extended to users outside the company.
- Peer to Peer (P2P) - Peer to Peer is a class of applications that operate outside the DNS system and have significant or total autonomy from central servers that take advantage of resources available on the Internet.

- Virtual Private Network (VPN) - A private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures.

The table below describes the key specifications and products within the Delivery Channels Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Internet	N/A	N/A	N/A	N/A
Intranet	PictureTel*	Video Tele-Conferencing (VTC) Services	PictureTel	Video Tele-Conferencing (VTC) Services
Extranet	N/A	Virtual Private Network	N/A	Virtual Private Network
Peer to Peer	N/A	N/A	N/A	N/A

*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that HUD continue to use the PictureTel product to deliver Video Teleconferencing (VTC). In addition, HUD should continue to use a Virtual Private Network (VPN) to allow remote access to those HUD resources that reside behind a firewall. Additional information is still being gathered on the additional products and specifications within HUD's Delivery Channels.

8.5.1.3 Service Requirements

Service Requirements - define the necessary aspects of an application, system or service to include legislative, performance and hosting.

- Legislative / Compliance - Defines the pre-requisites that an application, system or service must have mandated by congress or governing bodies.

- Authentication / Single Sign-on (SSO) – Refers a method that provides users with the ability to log-in one time, getting authenticated access to all their applications and resources.

- Hosting – Refers to the service provider who manages and provides availability to a web site or application, often bound to a Service Level Agreement (SLA). The Hosting entity generally maintains a server farm with network support, power backup, fault tolerance, load-balancing, and storage backup.

The table below describes the key specifications and products within the Service Requirements Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Legislative/ Compliance	BigShot v2 Braille Embosser Dragon NaturallySpeaking v7.3 Pro Juliet Pro 60, Optelec ClearView 700, Kurzweil 1000 v7 Jaws for Windows v5.0 Pro MAGic for Windows v8.0 Pro NTS (NXi Telephony Services) v4.01b PowerBraille v4 SuperVista* WinTalk TTY*	Section 508	BigShot Dragon Naturally Speaking JAWS for Windows KurzWeil 1000 MAGic for Windows Nxi NextCom Optelec ClearView 700 Optelec Spectrum CCTV PowerBraille SuperVista WinTalk TTY	Section 508
Authentication / Single Sign On (SSO)	PassGo Single Sign-on including SYNCOM3 v6.01 Sun One Directory Server iPlanet 4.0 LDAP* Netscape LDAP Server*	Lightweight Directory Access Protocol (LDAP)	PassGo Sun ONE Directory Server	Lightweight Directory Access Protocol (LDAP)

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Hosting	N/A	N/A	N/A	N/A

*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that all of HUD's existing section 508 software products be used in the target environment as these products all deliver unique technical capabilities within the Legislative / Compliance Service Standard. While the FEA TRM includes Lightweight Directory Access Protocol (LDAP) as a service specification in the Supporting Network Services service standard, HUD believes that it is also a specification in the Authentication/ Single Sign-On service standard. In addition, the PassGo product should continue to be used for Authentication / Single Sign On (SSO). Additional information needs to be gathered on HUD's Hosting standards.

8.5.1.4 Service Transport

Service Transport - defines the end-to-end management of the communications session to include the access and delivery protocols.

- Supporting Network Services - These consist of the protocols that define the format and structure of data and information that is either accessed from a directory or exchanged through communications.
- Transport Services - These consist of the protocols that define the format and structure of data and information that is either accessed from a directory or exchanged through communications

The table below describes the key specifications and products within the Service Transport Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Supporting Network Services	N/A	Dynamic Host Configuration Protocol (DHCP) Domain Name System (DNS) Internet Message Access Protocol/ Post Office Protocol (IMAP/ POP3) Lightweight Directory Access Protocol (LDAP) Simple Mail Transfer Protocol (SMTP) Simple Network Management Protocol (SNMP) H323	N/A	Dynamic Host Configuration Protocol (DHCP) Domain Name System (DNS) Internet Message Access Protocol/ Post Office Protocol (IMAP/ POP3) Lightweight Directory Access Protocol (LDAP) Simple Mail Transfer Protocol (SMTP) Simple Network Management Protocol (SNMP) H323 Extended Simple Mail Transfer Protocol (ESMTP)
Transport Services	Communication Server of OS 390 TCP/IP v2.1.0 NETEX* Novell Netware 3.12 / 3.2*	Transfer Control Protocol (TCP) Internet Protocol (IPv4) File Transfer Protocol (FTP) Hyper Text Transfer Protocol (HTTP) Hyper Text Transfer Protocol Secure (HTTPS)	N/A	Transfer Control Protocol (TCP) Internet Protocol (IPv6) File Transfer Protocol (FTP) Hyper Text Transfer Protocol (HTTP) Hyper Text Transfer Protocol Secure (HTTPS) IP Security (IPSEC)

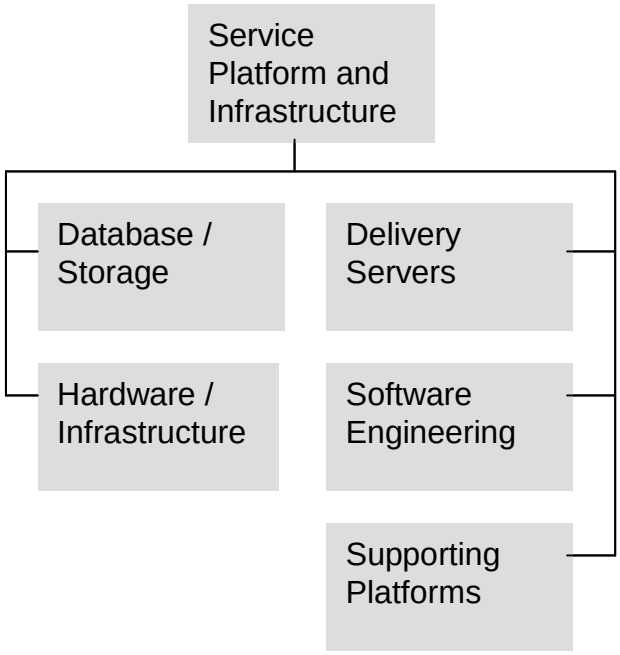
*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that HUD use all specifications listed in the table above within the target environment for both Supporting Network Services and Transport Services. It should be noted that the IPv6 specification will be necessary as the Office of Management and Budget (OMB) is requiring agencies to migrate to this specification. The target specifications and products listed above are recommended as generic industry technologies that can be applied to this area of the future technical architecture. Additional information is still being gathered on HUD's current products and specifications within the Transport Services service standard. As more information is gathered about HUD's Supporting Network Services and Transport Services, there will be a greater analysis of the impacts that changes in protocols such as Ipv6 will have on HUD's technology infrastructure. Additional information on the products that HUD uses for Supporting Network Services needs to be gathered. Note: The FEA Service Standard Service Transport has been renamed to Transport Services within HUD's TRM.

8.5.2 Service Platform and Infrastructure

Service Platform & Infrastructure - refers to the collection of delivery and support platforms, infrastructure capabilities and hardware requirements to support the construction, maintenance, and availability of a Service Component or capabilities.

Exhibit 8-6 – Service Platform and Infrastructure



8.5.2.1 Database Storage

Database / Storage - refers to a collection of programs that enables storage, modification, and extraction of information from a database, and various techniques and devices for storing large amounts of data.

- Database – Refers to a collection of information organized in such a way that a computer program can quickly select desired pieces of data. A database management system (DBMS) is a software application providing management, administration, performance, and analysis tools for databases.

- Storage – Storage devices are designed to provide shared storage access across a network. These devices provide extended storage capabilities to the network with reduced costs compared to traditional file servers.

- The table below describes the key specifications and products within the Database / Storage Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Database	DB2 v7.0 Microsoft Access 2002 Microsoft SQL 2000 Oracle 9i RDMS 9R3 Sybase v 12.5.x BRS SEARCH* DB2 / Database 2 Version 4.0* IMS* DBASE II / III* DMS-1100* DPS-1100* FoxBase* Microsoft Access 95/97* Microsoft SQL Server 6.5 / 6.5 Client / 7.0* Pyramid* RAMIS* Oracle 8i* Paradox 8* PROGRESS 8.1* Sybase version unspecified / 11.0 / 11.1.1 / 11.5.1 / 11.5.1.1 / 11.5.2 / 11.9 / 12 SYBASE IQ 11.2 / 12* SQL 6.0* Sybase SQL* Anywhere 5.5.04 Sybase SQL Central* VSAM*	N/A	Oracle 9i or later MS Access MS SQL Server 2000 or later ESRI ArcSDE	N/A
Storage Devices	N/A	Network-attached Storage (NAS)	N/A	Storage-Area Network (SAN) Network-

Service Standard	Currently In Use		Target Recommendations	
	Products	Specs	Products	Specs
				Attached Storage (NAS)

*Non-CCMB approved products that are currently being used at HUD.

Discussion
Products and specifications like DMS-1100, FoxBase, Informatica Power Center, Paradox, Progress, RAMIS, RDMS-1100 and Pyramid are based upon legacy or outdated technology and are not widely supported. It is recommended that HUD discontinue the support of these database products and specifications, which are based upon legacy-type database technology (e.g. network databases), and replace them with modern products and specifications that are relational. Recommended database technology products and specifications include Microsoft SQL Server, Microsoft Access and Oracle. This recommendation is based upon an analysis of the products and specifications that comprise HUD's applications as well as the scalability needed for enterprise-wide database performance. This analysis reveals that Microsoft SQL Server is widely used and supported across HUD already. Oracle is being recommended as it is among the most scalable of all relational database products. MS Access should be used for smaller applications and development efforts that do not require a high-degree of data storage and manipulation, and don't have a big user base. Other relational database products such as Sybase are not as widely used and supported across HUD, and do not have the scalability that MS SQL Server or Oracle have. Therefore, it is also recommended that these products be migrated to either a SQL Server or Oracle database over time. Having a database architecture standardized between a couple of leading products in the database product market allows HUD to take advantage of the cost savings and hosting opportunities that are discussed in section 8.5 of this document. HUD should use both Storage Area Network (SAN) and Network-Attached Storage (NAS) specifications. Additional information on the storage device products that support HUD need to be gathered.

Delivery Servers

Delivery Servers - Front-end platforms that provide information to a requesting application. It includes the hardware, operating system, server software, and networking protocols.

- Web Servers – A computer that provides World Wide Web services on the Internet. It includes the hardware, operating system, Web server software, TCP/IP protocols and the Web site content (Web pages). If the Web server is used internally and not by the public, it may be known as an "intranet server."

- Media Servers – Provide optimized management of media-based files such as audio and video streams and digital images.

- Application Servers – In a three-tier environment, a separate computer (application server) performs the business logic, although some part may still be handled by the user's machine. After the Web exploded in the mid 1990s, application servers became Web based.

- Portal Servers – Portals represent focus points for interaction, providing integration and single-source corporate information.

The table below describes the key specifications and products within the Delivery Servers Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Web Servers	Microsoft Internet Information Server v5 Windows 2000 Servers Windows 2000 Advanced Servers Sun One Enterprise Apache* MS IIS 3.0 / 4.0*	N/A	MS Internet Information Server Apache SunONE	N/A
Media Servers	RealPlayer MacroMedia Flash Player MS Media Server* Real Audio*	N/A	MS Media Server	N/A

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Application Servers	Lotus Notes / Domino R6.5.X Sun One v7 ColdFusion Enterprise v5.0 BlackBerry Enterprise Server for Domino v2.2 ARCHIBUS/FM 10* Apache/Tomcat* BEA WebLogic* Imaging Server 3.2* NetDynamics* Netscape iPlanet Enterprise Edition 6.0* Netscape Suitespot 3.6* Unicenter TNG 2.2* Sun One Enterprise Edition* ColdFusion 3.0 / 3.1 / 4.0.1/ 4.5.1 / ColdFusion Enterprise* NetDynamics 4.1* Netscape Enterprise Server 3.0 / 3.6.1 / 3.6.2*	N/A	SunONE Enterprise Apache/Tomcat BEA WebLogic	
Portal Servers	PeopleSoft Portal Server*	N/A	N/A	N/A

*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that HUD use a combination of web servers to deliver web content through applications. These would include the latest versions of both Sun ONE and IIS web servers to support both a J2EE and .NET environment. The Cold Fusion Enterprise Server product has limited scalability in an environment where service components are shared and reused across the enterprise and, therefore, is not recommended as a delivery server standard. HUD should continue to use the MS Media Server service specification to deliver media content. Currently HUD uses the PeopleSoft Portal Server product to deliver portal-based solutions. Additional Portal Server products will need to be analyzed to provide an alternative for portal-based solutions. In addition, it should be noted that the continued use of SunONE as the J2EE platform standard needs to be revisited; WebLogic and Apache are currently supported as integrated back-ends for COTS products (PeopleSoft etc.); there may be an opportunity to consolidate these products. The possible expansion of mainstream open source products, such as Apache/Tomcat, may be a viable goal.

8.5.2.3 Hardware / Infrastructure

Hardware / Infrastructure - defines the physical devices, facilities and standards that provide the computing and networking within and between enterprises.

- Servers / Computers – This refers to the various types of programmable machines which are capable of responding to sets of instructions and executing programs.
- Embedded Technology Devices – This refers to the various devices and parts that make up a Server or Computer as well as devices that perform specific functionality outside of a Server or Computer.
- Peripherals – Computer devices that are not part of the essential computer (i.e. the memory and microprocessor). Peripheral devices can be external and internal.
- Wide Area Network (WAN) - A data network typically extending a LAN outside a building or beyond a campus. Typically created by using bridges or routers to connect geographically separated LANs. WANs include commercial or educational dial-up networks such as CompuServe, InterNet and BITNET.

- Local Area Network (LAN) - A network that interconnects devices over a geographically small area, typically in one building or a part of a building. The most popular LAN type is Ethernet. LANs allow the sharing of resources and the exchange of both video and data.

- Network Devices / Standards - A group of stations (computers, telephones, or other devices) connected by communications facilities for exchanging information. Connection can be permanent, via cable, or temporary, through telephone or other communications links. The transmission medium can be physical (i.e. fiber optic cable) or wireless (i.e. satellite).

- Video Conferencing - Communication across long distances with video and audio contact that may also include graphics and data exchange. Digital video transmission systems typically consist of camera, codec (coder-decoder), network access equipment, network, and audio system.

The table below describes the key specifications and products within the Hardware / Infrastructure Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Servers/ Computers	Sun Ultra-SPARC based servers Intel based pentium III PC (128 MB RAM, 15 GB HDD, 3.5 FDD, CD-ROM, 17" color monitor) Hitachi Main Frame Focus* HDS MF* IBM AS400* Unisys 2200 MF* Unisys S7000*	N/A	N/A	Open Standards (Unix) enterprise server Intel-based server Commodity Intel-based workstation
Embedded Technology Devices	N/A	N/A	N/A	N/A
Peripherals	ScanSoft Omnipage v12 Captaris Rightfax Fax Server Software v8	N/A	N/A	N/A
Wide Area Network (WAN)	ATM	N/A	N/A	Special-purpose router General-purpose router Special-purpose gateway (firewall)

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Local Area Network (LAN)	N/A	N/A	N/A	Enterprise-level managed switch Workgroup-level switch Network bridge Media converter Range extender (network repeater)
Network Devices/ Standards	OC3 ISDN Ethernet* Token Ring* ClearChannel* T1* Frame Relay* Cisco Local Director*	Should probably look up IEEE designations (i.e. 802.3 for Ethernet),	Ethernet T1/E1 ATM OC3	N/A
Video Conferencing	PictureTel*	N/A	MS NetMeeting	Microsoft Media Server (MMS) protocol

*Non-CCMB approved products and specifications that are currently being used at HUD.

Discussion
Products and specifications such as IBM AS400, HDS, Unisys S7000 and Unisys OS 2200 are based upon legacy or outdated technology and are designed for mainframe environments. Other products such as Sun-Ultra SPARC are simply outdated. It is recommended that HUD migrate from legacy infrastructure platforms to a standardized mix of platforms. These would include newer versions of UNIX and Intel based servers. The additional target specifications and products listed above are recommended as generic industry technologies that can be applied to this area of HUD's future technical architecture.

8.5.2.4 Software Engineering

Software Engineering - software engineering covers not only the technical aspects of building software systems, but also management issues, such as testing, modeling and versioning.

- Integrated Development Environment (IDE) – This consists of the hardware, software and supporting services that facilitate the development of software applications and systems.

- Software Configuration Management – Applicable to all aspects of software development from design to delivery specifically focused on the control of all work products and artifacts generated during the development process. Several solutions on the market provide the integration of the software configuration management functions.

- Test Management – The consolidation of all testing activities and results. Test Management activities include test planning, designing (test cases), execution, reporting, code coverage, and heuristic and harness development.

- Modeling – The process of representing entities, data, business logic, and capabilities for aiding in software engineering.

The table below describes the key specifications and products within the Software Engineering Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Integrated Development Environment (IDE)	ACOB 7R3A COBOL for OS/390 v2.01.0 COOL:Gen v6.5 Dreamweaver v3.0.3 LINC 16R3 Lotus Notes / Domino vR6.5.x J2EE SDK Sun ONE (Enterprise Edition) v7.0 UCOB 9R1 Authorware (CASE)* IBM Assembler* IEF Composer 3v5.3* Livewire* Oracle Developer 2000* PowerSoft CGI Processor* Cool Gen 4.1A / 6.0* Unisys Assembler* VS COBOL II Compiler & Library 1.4.0*	J2EE	J2EE IDE (TBD) MS Visual Studio .net	J2EE .net

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Software Configuration Management	CA-Endevor v3.8 CA-Endevor for MVS v3.8 Cmplus 11R1 Merant Professional v8.0 Peregrine Service Center v5 Teamstudio Edition 12 DB Artisan* Easel* Eastman Enterprise Work Management* Eastman Open Image/Open Workflow* Install Shield* Quest Stat Configuration Management Tool* Seagate Backup Exec 6.1* Visual Café*	N/A	PVCS	N/A
Test Management	Mercury Interactive LoadRunner v7.8 Mercury Interactive TestDirector v8.0 Mercury Interactive WinRunner v7.6 Silk Performer v6 Wise Packages Studio Enterprise	N/A	Mercury	N/A

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Modeling	Erwin v3.5 Visio Professional 2002 BPWin* ERWin 3.5 / Unspecified* JSP 2* Oracle Designer 2000* TOAD 7.2* AutoCAD Release 14* CASE IE*	N/A	N/A	UML

*Non-CCMB approved products that are currently being used at HUD.

Discussion
Products and Standards like ACOB, COBOL for OS/390, SAS, UCOB, IBM Assembler, and LINC are based upon legacy or outdated technology and are not widely-supported. It is recommended that HUD discontinue the support of these technology products and standards, and others that support Assembly-type languages, and move towards the use of products or specifications that support a J2EE or .NET development environment. The use of VisualStudio .NET as well as common J2EE development environments such as VisualCafe or Borland should be considered. In addition, HUD should consolidate its various Configuration Management software to only use PVCS. Test management should be done using Mercury, and modeling should be done using a product that can also perform UML capabilities.

8.5.2.5 Supporting Platforms

Supporting Platforms - supporting platforms are hardware or software architectures. The term originally dealt with only hardware, and it is still used to refer to a CPU model or computer family.

- Wireless / Mobile - Radio transmission via the airwaves. Various communications techniques are used to provide wireless transmission including infrared line of sight, cellular, microwave, satellite, packet radio and spread spectrum.

- Platform Independent - Defines the operating systems and programming languages that are able to execute and run on any platform or operating system. A platform is the underlying hardware and software comprising a system.

- Platform Dependent - Defines the operating systems and programming languages that are able to execute and run on a specific platform or operating system. A platform is the underlying hardware and software comprising a system.

The table below describes the key specifications and products within the Supporting Platforms Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Wireless/ Mobile	Blackberry PocketPC*	N/A	PocketPC Blackberry	N/A
Platform Independent	N/A	N/A	N/A	N/A
Platform Dependent	IBM OS390 2200/9433 (HCC) and 2200/9222 (DRF) Unisys OS 2200 UNIX Solaris 2.6 Windows 2000 Windows NT Windows XP UNIX* DOS Batch Files* HUDWare 2 (Windows 95 and Office 95)* Microsoft Windows 3.1 / 95* MS-DOS* MVS ESA 2.3.1* Microsoft Windows NT 3.51 / 4.0 SP5 / 4.0 SP6 and SP6a / version unspecified* AS/400 V4R2* OS2200* OS390* Unisys OS1100* SB6 6D2	N/A	N/A	N/A

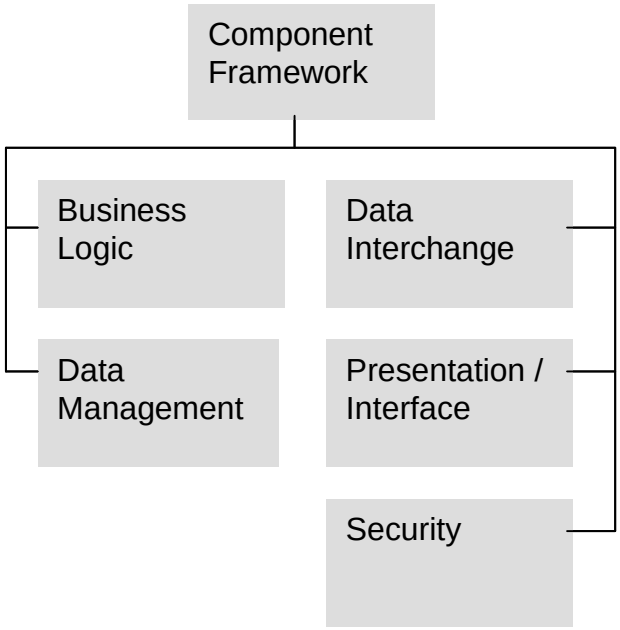
*Non-CCMB approved products that are currently being used at HUD.

Discussion
HUD currently uses both PocketPC and Blackberry to access resources through wireless and mobile protocols. It is recommended that HUD continue to use these products. Additional information needs to be gathered for the remaining service standards within the Supporting Platforms service category.

8.5.3 Component Framework

Component Framework - refers to the underlying foundation, technologies, standards, and specifications by which Service Components are built, exchanged, and deployed across Component-Based, Distributed, or Service-Orientated Architectures.

Exhibit 8-7 – Component Framework



8.5.3.1 Business Logic

Business Logic - defines the software, protocol or method in which business rules are enforced within applications.

- Platform Independent - Consists of all software languages that are able to execute and run on any type of operating system or platform.
- Platform Dependent - Consists of the programming languages and methods for developing software on a specific operating system or platform.

The table below describes the key specifications and products within the Business Logic Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Platform Independent	Microsoft Visual C++ 6.0* Sun Java Runtime Environment (JRE) 1.3.1* Java 1.2* JavaScript 1.3 / Unspecified*	COBOL C, C++ Visual C++ Java JavaScript PERL	N/A	J2EE

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Platform Dependent	CICS v4.1 PowerBuilder v8.03 9 SAS v6.09 Visual Basic v6.0 COBOL / OS390 v2.01.0 / COBOL II* FTN - ASCII Fortran 11R20 / 11R2R* IBM JCL* MicroFocus Net Express COBOL Compiler* MicroFocus Server Express COBOL Compiler* PowerBuilder (version unspecified) / 5.0 / 6.5* SAS IML - Interactive Matrix Language 6.09* UFTN - UCS Fortran 6R1* Microsoft Visual Basic (version unspecified) / 5.x)* WINBATCH*	Visual Basic PL/SQL Transact-SQL CICS COBOL DPS-1100 FORTRAN JCL Visual Basic EASYTRIEVE	N/A	VB.net ASP.net C#.net

*Non-CCMB approved products that are currently being used at HUD.

Discussion
Specifications and Products such as CICS, COBOL, DPS-1100, FORTRAN, JCL, PERL, C/C++, and Visual Basic are based on either legacy or outdated technology and are either not widely supported or not supported at all. It is recommended that HUD begin to build its business logic technologies and move towards scalable specifications and products based upon either the J2EE specification, or alternatively, the .NET framework. This recommendation is made based upon the fact that a number of HUD's applications already use J2EE in their business logic and it is already supported across the agency. In addition, the .NET framework can be used for those applications that are already built upon the Microsoft standard.

8.5.3.2 Data Interchange

Data Interchange - define the methods in which data is transferred and represented in and between software applications.

- Data Exchange – Data Exchange is concerned with the sending of data over a communications network and the definition of data communicated from one application to another. Data Exchange provides the communications common denominator between disparate systems.

The table below describes the key specifications and products within the Data Interchange Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Data Exchange	Informatica Power Center v7.1.2 Arcserve Agent for Windows NT / Cheyenne* Culprit* EaDIplus* Eastman Imaging v2.0* EZComm Barcode software* Hummingbird 7.0* Microsoft SNA Server 3.0* NSI Double Take 3.0.6* Trillium Software System*		N/A	XML SOAP XTML

*Non-CCMB approved products that are currently being used at HUD.

Discussion
Further analysis of the various other specifications and products needs to take place prior to providing a recommendation for their place in the target environment. However, it is recommended that HUD begin incorporating technologies such as the Standard Object Access Protocol (SOAP) and XML specifications into the data interchange layer and move away from current proprietary products to perform data exchange. XML and SOAP are industry standards and are designed to support a Service-Oriented Architecture (SOA).

8.5.3.3 Data Management

Data Management - The management of all data/information in an organization. It includes data administration, the standards for defining data and the way in which people perceive and use it.

- Database Connectivity - Defines the protocol or method in which an application connects to a data store or data base.
- Reporting and Analysis - Consist of the tools, languages and protocols used to extract data from a data store and process it into useful information.

The table below describes the key specifications and products within the Data Management Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Database Connectivity	UNIACCESS 6R2 Gen Comm Bridge v4.1a NOMAD v6.50a Tantia HFT* DCOM* Net8* DB2 Connector* Direct Connect 10.5/11.1/12.0* Infopump 3.1 (Sybase)* MDI Database Gateway 2.0* Omni Connect* Open Client 11.5* Quest Foglight / Spotlight* SQL Link Server Admin 2.03* Web SQL 1.2 / Unspecified* COM Proxy for Cool Gen 5.0* JDBC Type 4 (Sybase jConnect 5.5)*	ODBC JDBC RDF OLE/DB	N/A	ADO .net JDBC

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Reporting and Analysis	Actuate e.Reporting v7sp1 BusinessObjects Crystal Reports Professional v10 Cognos Impromptu v7.1 MR2 Microstrategy v7.5.2 Seagate Crystal Enterprise Server v8.5 WebFOCUS v5.2.x Actuate 3.2.2.1 / v5.0* DEPCON Central v5r2* Cognos Impromptu 4.01* Crystal Decision* Crystal Reports 8.0* Crystal Reports version unspecified / 5.0 / 6.0* Hyperion Enterprise* Expert Choice* InfoMaker* OnDemand* SPSS*	N/A	Crystal Reports SAS SPSS	N/A

*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that HUD use the products and specifications listed above for database connectivity. These are modern industry standards that support business application-to-database connectivity. As for reporting and analysis, additional analysis needs to take place on some of the products and specifications that currently exist at HUD. For the purposes of standardization and scalability, HUD should use a reporting tool that can be accessed by several different environments and platforms. One recommended product would be Crystal Reports. Crystal Reports can be accessed via frameworks that already exist within both the J2EE and .NET platforms.

8.5.3.4 Presentation / Interface

Presentation / Interface - defines the connection between the user and the software, consisting of the presentation that is physically represented on the screen.

- Static Display - Static Display consists of the software protocols that are used to create a pre-defined, unchanging graphical interface between the user and the software.
- Dynamic / Server-Side Display - This consists of the software that is used to create graphical user interfaces with the ability to change while the program is running.
- Content Rendering - This defines the software and protocols used for transforming data for presentation in a graphical user interface.
- Wireless / Mobile / Voice - Consists of the software and protocols used for wireless and voice-enabled presentation devices.

The table below describes the key specifications and products within the Presentation/Interface Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Static Display	Adobe Acrobat Professional v6 PurEdge Viewer v6 FormFlow* Adobe Acrobat Reader 3.0 / 5.0* Adobe Acrobat Writer 5.0*	HTML XHTML	PureEdge	XML PDF
Dynamic/ Server-side Display	Microsoft Active Server Pages (ASP) / 2.0 Infragistics JSuite*	ASP HTML	Infragistics JSuite	J2EE ASP.NET

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Content Rendering	Adobe Photoshop v7 EMC Documentum v5.2 ESRI ArcView v3.2 v9 ESRI ArcIMS v3.1 ESRI ArcExplorer v9 ESRI ArcSDE v9 Macromedia Spectra 1.5 Microsoft Office 2000 Microsoft Publisher 2003 OrgPublisher / OrgBuilder v6 CSS* MAPPER* Microsoft Office (Version Unspecified)* Document System (ProDoc)* Microsoft Excel 97* Microsoft Office 95 / 97*	DHTML	ESRI ArcExplorer	N/A
Wireless/ Mobile/ Voice	N/A	N/A	N/A	N/A

*Non-CCMB approved products that are currently being used at HUD.

Discussion
It is recommended that HUD begin to use J2EE and ASP.NET for it's presentation / interface layer of it's business applications, replacing ASP and static HTML for presentation. XML and PDF should be used as specifications for static display and the ESRI ArcExplorer should continue to be used as a product for content rendering. Various other products and standards within the Presentation/Interface service standard are still being assessed for their place in HUD's technical architecture.

8.5.3.5 Security

Security - defines the methods of protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide integrity, confidentiality and availability. Biometrics, two-factor identification, encryption, and technologies based on the NIST FIPS-140 standards are evolving areas of focus.

- Certificates / Digital Signature - Software used by a certification authority (CA) to issue digital certificates and secure access to information. The evolution of Public Key Infrastructure (PKI) is based on the verification and authentication of the parties involved in information exchange.

- Supporting Security Services - These consist of the different protocols and components to be used in addition to certificates and digital signatures.

The table below describes the key specifications and products within the Security Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Certificates/ Digital Signature	N/A	X.500	N/A	X.500
Supporting Security Services	SSH Server for Windows SSH Client for Windows Open SSH Server / Client McAfee v8.0i CA Top Secret* InterAccess* Telnet 2.0* TelnetD 4.0*	SSH	N/A	SSH SSL WS Security

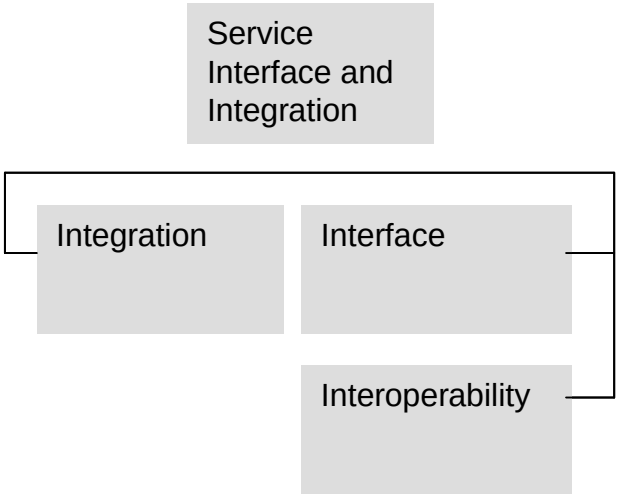
*Non-CCMB approved products that are currently being used at HUD.

Discussion
The target specifications listed above are recommended as generic industry technologies that can be applied to this area of the future technical architecture. A deeper analysis of HUD's security architecture is recommended in order to make an informed recommendation for the use of specific products and specifications within the Security service category.

8.5.4 Service Interface and Integration

Service Interface and Integration - refers to the collection of technologies, methodologies, standards, and specifications that govern how agencies will interface (both internally and externally) with a Service Component. This area also defines the methods by which components will interface and integrate with back office / legacy assets.

Exhibit 8-8 – Service Interface and Integration



8.5.4.1 Integration

Integration - defines the software services enabling elements of distributed business applications to interoperate. These elements can share function, content, and communications across heterogeneous computing environments. In particular, service integration offers a set of architecture services such as platform and service location transparency, transaction management, basic messaging between two points, and guaranteed message delivery.

- Middleware – Middleware increases the flexibility, interoperability, and portability of existing infrastructure by linking or "gluing" two otherwise separate applications.

- Enterprise Application Integration – Refers to the processes and tools specializing in updating and consolidating applications and data within an enterprise. EAI focuses on leveraging existing legacy applications and data sources so that enterprises can add and migrate to current technologies.

The table below describes the key specifications and products within the Integration Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Middleware	CA-AutoSys 3270 Emulation on PC* AutoSys / PeopleSoft Adapter* CA Clipper* Clipper* CICS Socket Listener* COM+* Microsoft Transaction Server 2.0* Net Dynamics*	N/A	N/A	NET 8 MQ Series DCOM Java Management Adapter (JMA)
Enterprise Application Integration	N/A	N/A	N/A	N/A

*Non-CCMB approved products that are currently being used at HUD.

Discussion
Clipper, FoxPro, and CICS Socket Listener are based upon legacy technologies. It is recommended that HUD move away from these middleware technologies and embrace products and specifications based upon the XML standard. This is a vendor-neutral standard which is scalable, can be leveraged in various different environments and compliments the J2EE and .NET platforms.

8.5.4.2 Interface

Interface - defines the capabilities of communicating, transporting and exchanging information through a common dialog or method. Delivery Channels provide the information to reach the intended destination, whereas Interfaces allow the interaction to occur based on a predetermined framework.

- Service Discovery - Defines the method in which applications, systems or web services are registered and discovered.
- Service Description / Interface - Defines the method for publishing the way in which web services or applications can be used.

The table below describes the key specifications and products within the Interface Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Service Discovery	N/A	N/A	N/A	WSDL
Service Description/ Interface	Direct Connect MDI	N/A	N/A	UDDI

*Non-CCMB approved products that are currently being used at HUD.

Discussion
Currently, HUD does not have any web services-based applications in production. However, the Web Services Discovery Language (WSDL) and the Universal Description, Discovery and Integration (UDDI) specifications should be leveraged as the move towards a service-oriented architecture occurs.

8.5.4.3 Interoperability

Interoperability - defines the capabilities of discovering and sharing data and services across disparate systems and vendors.

- Data Format / Classification – Defines the structure of a file. There are hundreds of formats, and every application has many different

variations (database, word processing, graphics, executable program, etc.). Each format defines its own layout of the data. The file format for text is the simplest.

- Data Types / Validation – Refers to specifications used in identifying and affirming common structures and processing rules. This technique is referenced and abstracted from the content document or source data.

- Data Transformation - Data Transformation consists of the protocols and languages that change the presentation of data within a graphical user interface or application.

The table below describes the key specifications and products within the Interoperability Service Category that are currently in place at HUD, and a recommendation for them within the target architecture.

Service Standard	Currently In Use		Target Recommendations	
	Products	**Specs**	**Products**	**Specs**
Data Format/ Classification	N/A	N/A	N/A	XML
Data Types/ Validation	ESRI ArcGIS Winzip	N/A	ESRI ArcGIS	XML Schema
Data Transformation	Informatica PowerCenter Trillium Software System*	N/A	N/A	XSLT

*Non-CCMB approved products that are currently being used at HUD.

Discussion
The target specifications and products listed above are generic industry standards that work well in a service-oriented architecture and interoperate well with other technologies. More data needs to be gathered to make an informed recommendation for specific products and specifications to be used in this section of the target technology layer.

8.6 TECHNOLOGY OPPORTUNITIES ANALYSIS

An analysis of HUD's applications aligned to standards, specifications and products within the TRM resulted in the identification of applications that use

the same types of products and specifications. This serves as a valuable point of analysis for IT asset reuse, integration, the transition towards product consolidation and more cost-effective licensing agreements between HUD and product vendors.

It is important to point out these opportunities within the context of a target technology layer, as there is no better time to focus on these opportunities than during a transition phase. Plans for achieving such opportunities will be included as part of the Transition Plan from HUD's baseline architecture to the target architecture.

8.6.1 SmartBUY and Bulk Licensing

SmartBUY is a Federal initiative to support the government-wide aggregate buying of commercial software in an effort to achieve bulk savings. GSA leads an interagency team in negotiating government-wide enterprise licenses for software under the SmartBUY initiative. The SmartBUY initiative includes commercial off-the-shelf software that is generally acquired using license agreements with terms and prices that vary based on volume. SmartBUY includes the following types of software licenses: Office Automation; Network Management; Antivirus; Database; Business Modeling Tools; and Open source software support.

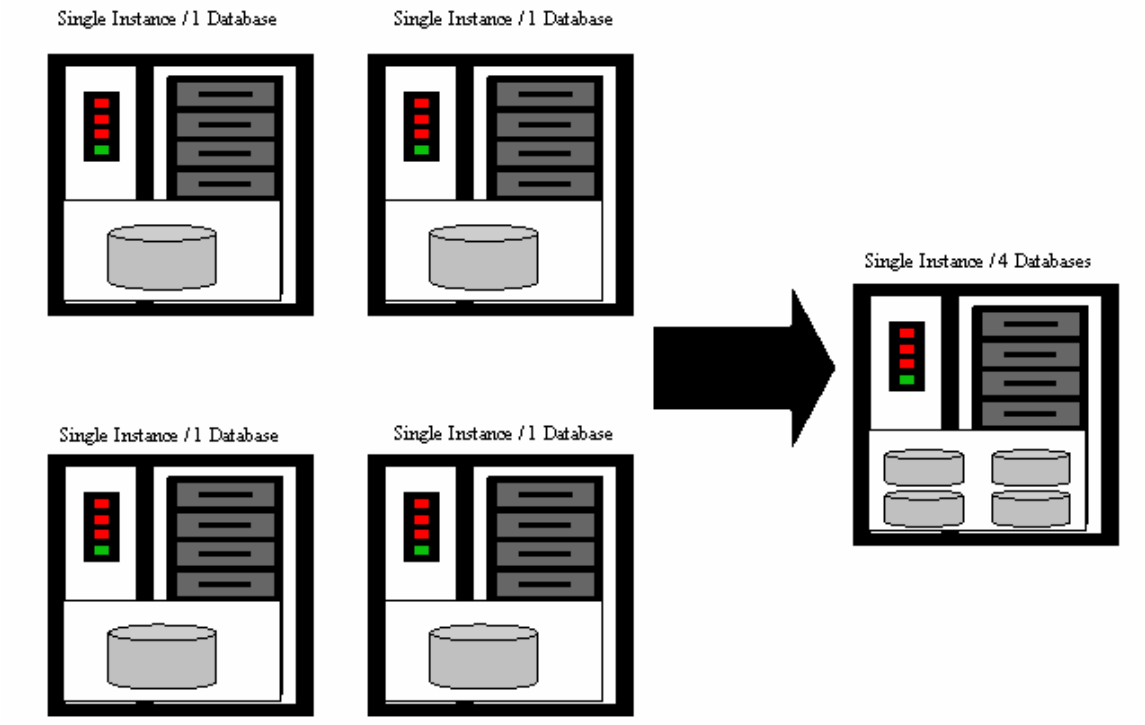
To illustrate how software product licensing can be leveraged using the HUD TRM, consider the Database Service Standard, within the Database/Storage Service Category under the Service Platform and Infrastructure Service Area. An analysis of the Service Specifications that make up HUD's applications revealed that there are approximately 36 different instances of the Microsoft SQL Server database used by applications across HUD. This is an opportunity for HUD to leverage government-wide vehicles, such as SmartBUY, to achieve cost-savings. The example provided is illustrative, and can be applied to the many technology products that HUD uses to support and implement business services and capabilities.

To improve upon the efficiency and cost savings of both managing HUD's technology infrastructure and purchasing strategies, a deeper analysis and move towards bulk licensing agreements for the most commonly used software products throughout HUD's applications should take place. Further, detailed analysis on this opportunity will be covered within HUD's Transition Plan from the baseline architecture to the target architecture.

8.6.2 Technology Product Hosting

Another opportunity that HUD has involving technology management is based upon the infrastructure that supports common products. With multiple instances of a specific product being implemented across HUD's applications there exists the opportunity, where applicable, to leverage the same hardware infrastructure to host those products. Taking the example provided in the previous section, several Microsoft SQL Server databases can reside on a single instance, or server, and be accessed by those applications that need to use their respective databases. A consolidation of products to shared hardware needs to be done on a case-by-case basis. Some factors to consider include data sensitivity, security, hardware requirements and accessibility. Exhibit 8-9 illustrates the concept of moving the same type of product from 4 separate hosting instances to a single instance, while still maintaining their functional separation. Further, detailed analysis on this opportunity will be covered within HUD's Transition Plan from the baseline architecture to the target architecture.

Exhibit 8-9 – Hosting of Common Products



9 NEXT STEPS

The primary purpose of the Target EA is to effectively plan a course for achieving HUD's strategic vision and goals. It is one element in a broader set of inter-related planning activities that collectively enable HUD managers and staff to define a vision, develop strategies and plans for achieving the vision, make resource decisions, implement strategies, and evaluate performance. Creating, implementing, and redefining HUD's Target EA is an ongoing and iterative process. The purpose of this section is to briefly discuss how the Target EA will evolve and also how it will be used in other processes to drive toward implementation. There are four major next steps discussed below:

- Revising and Maintaining the Target EA.
- Conducting a Strategic Portfolio Review of the FY 2006-2007 IT investment portfolio (similar to the recently-completed FY2005-2006 IT investment portfolio review).
- Supporting the ITIM Select process for the FY 2007 IT investment portfolio.
- Developing and maintaining an EA Transition Plan.

9.1 REVISING AND MAINTAINING THE TARGET EA

Target EA defines an end-state for HUD's performance, business, applications and services, technology, data, and security at the end of a five to seven year planning horizon. With such a long time horizon, the target will gradually shift and evolve over time. Changes in HUD's strategy and priorities, drivers, or available technologies may cause HUD to re-evaluate and revise the Target EA. Through proactive EA maintenance, the EA practice will work with HUD's programs to make sure that the Target EA evolves to address these changes. As significant changes are addressed, HUD will release new versions of the Target EA.

In addition, because Target EA Version 2.0 does not completely address all of the elements of HUD's EA Framework, new versions will be released as these elements are completed. The major areas in which the Target EA will be augmented in the near-term are the Performance and Security Layers.

Performance Layer – Like the Data Layer, performance measures associated with the different architectural layers are best understood and defined by the LOB to which they apply. Therefore, performance measures will be defined through HUD's Segment Architecture efforts, and will eventually be rolled up and integrated into the overall Target EA. Once performance measures have been associated with the layers of the Target EA, HUD will be able to better evaluate the performance benefits associated with the implementation of different elements of the Target EA.

Security Layer – Security will be addressed holistically at the Department level. Security in the Target EA is represented as a cross-cutting set of policies, processes, service components, and technologies. It is integrated into each of the architectural layers depicted in the EA framework. For example, LOBs must define policies and procedures for managing sensitive data, based on the level of sensitivity associated with the data. Within HUD's business functions, "IT Security" is addressed within the Information and Technology Management function. Within HUD's service components, "Security Management" is a service type consisting of numerous security-related service components. Finally, in the Technology Layer, "Security" is a service category consisting of security-related technologies. HUD is currently defining the technology layer requirements and will be addressing security architecture considerations across all layers in future iterations. Security measures will be developed in accordance with legislative and regulatory security and privacy requirements, as well as from other applicable policies and guidelines. Examples of security requirements include the Privacy Act of 1974, the Federal Information Security Management Act (FISMA), and OMB A-130 Security of Federal Automated Information Resources (App.III).

9.2 CONDUCTING THE STRATEGIC PORTFOLIO REVIEW

The Department recently completed a comprehensive Strategic Portfolio Review (SPR) of the FY 2005-2006 IT investment portfolio. Because of its success in bringing EA considerations to the attention of business leaders and project managers, the EA Practice expects to conduct an SPR annually during the Pre-Select and Select phases of the IT Investment Management (ITIM) cycle. The current working version of the Target EA at that time will be a major input to the review.

The SPR takes an enterprise-wide view of the portfolio, with a strong focus on the evaluation of HUD's IT portfolio relative to EA principles (e.g.

interoperability and reuse). The major focus areas and outcomes for the SPR are:

- **Review of General Portfolio Characteristics** – A number of analytics are applied to provide decision-makers with at-a-glance views of key characteristics of the portfolio as a whole, such as breakouts by size of investment, lifecycle phase, and spending by program or office. The Target EA provides a number of important new factors on which to evaluate the portfolio, such as degree of overlap by line of business, function, or service component.

- **Target EA Compliance** – Initiatives are reviewed for compliance with the Target EA so that program managers can re-evaluate and address any compliance issues prior to the Select Phase. Compliance with the EA encompasses alignment with the principles and general direction of the Target EA (e.g. sharing and reuse of common components), reference model alignment, and compliance with target technical specifications and products.

- **Opportunities Analysis and Recommendations** – Taking a holistic view of the portfolio, across individual initiatives, enables the identification of opportunities that might otherwise be missed. Key opportunities explored through the SPR include: sharing and reuse, consolidation of duplicative resources, and integration with government-wide initiatives. In addition, initial consideration is given to logical candidates for strategic LOBs or tactical cross-cutting services that should be addressed through the Department-wide Segment Architecture initiative.

The Office of the CIO will conduct a similar Strategic Portfolio Review on the FY2006-2007 portfolio to support FY2008 investment portfolio selection activities.

9.3 SUPPORTING THE ITIM SELECT PROCESS

HUD's EA practice and ITIM practice are collectively addressing the need to better integrate EA and ITIM. A number of activities are planned to better infuse EA considerations throughout the Select, Control, and Evaluate phases of the ITIM lifecycle. The most significant near-term activity is for the EA practice to support the HUD Select phase for the FY 2006-2007 IT

investment portfolio. This support, which is currently ongoing, takes three primary forms:

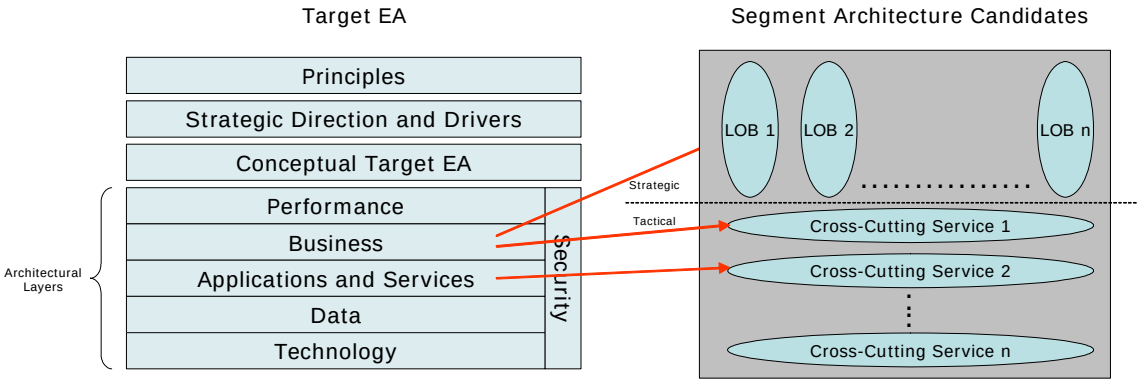
- Refine Select process to ensure that the Target EA is given due consideration (completed)
- Assist in the definition of and assignment of revised weights to EA evaluation criteria (completed)
- Assist in the review of initiatives against EA criteria (ongoing)

9.4 DEVELOPING AND MAINTAINING THE EA TRANSITION PLAN

The EA Transition Plan defines a high-level roadmap for HUD's IT modernization efforts. The current version (Version 1.0) of the EA Transition Plan (EATP) was developed based on Target EA Version 1.0. The completion of Target EA Version 2.0 does not fundamentally change the course established in Target EA Version 1.0, and the current version of the EATP will not be immediately updated. However, when the EATP is next updated, the current version of the Target EA at that time will be reviewed to determine any new requirements to incorporate in the EATP. For example, with the incorporation of the DRM into this version of the Target EA, the data infrastructure modernization path will be more explicitly addressed in future versions of the EATP.

The EA Transition Plan uses Segment Architectures as the primary building blocks in achieving the Target EA, and sequences Segment Architecture efforts in light of resource priorities, constraints, dependencies, and other considerations. As Exhibit 9-1 below illustrates, the Target EA Business Layer serves as a source for identifying strategic LOB segments, while both the Business Layer and Applications and Services Layer serve as sources for identifying tactical cross-cutting segments.

Exhibit 9-1 – Segment Architecture Identification



Building on the work of the SPR, the EA Transition Plan also identifies and sequences other opportunities to move HUD toward the Target EA, such as opportunities to consolidate duplicative initiatives.